COMPUTERWORLD

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After the Fire, Where Do You Put the New System?

By Edward J. Bride
Of the CW Staff

NEW YORK – A computer user's ability to recover from a fire will depend on the building and not the hardware, thereby necessitating extensive fire protection programs, according to a leading security consultant.

This assumes that the "prudent data processing executive" has a well developed and tested contingency plan, including off-site storage and up-to-date copies of programs, data files, and documentation, according to Robert V. Jacobson, president of Bradford Security Systems here.

Hardware manufacturers "without question" will "bend every effort" to replace damaged or destroyed hardware, Jacobson said. "The challenge," he continued, "will be to find a place to install the hardware," so that necessary electric power, air conditioning, working space, user convenience, and physical security can be ensured.

Need Recovery Location

Contingency plans for disaster, a much-needed but much-ignored element of DP planning, should include a recovery location that could be used at least temporarily, Jacobson indicated.

A five-step fire protection plan in a computer facility is similar to that of any other business or industrial environment, except for one factor: loss control.

The first four elements are prevention, detection, personnel evacuation, and fighting the fire, according to Jacobson. The last step requires advance planning and organized procedures unique to a data center, he noted.

All large businesses should have a fire protection officer, an expert in his field, who establishes the standard preventive/protective measures.

When a fire occurs in a DP room, and the protection officer orders an evacuation and shutdown of operations, the loss control team begins to protect the DP assets, Jacobson noted.

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IBM Closes the Gap

System/3 Gets Tape, 360-370 Get Mini Cards

By Ronald A. Frank
Of the CW Staff

WHITE PLAINS, N.Y. – In a move affecting most of its users, IBM has extended mag tape capabilities to the System/3 Model 10 and added the 96-column card to most smaller models of the 360 and 370 series. In addition the 3270 CRT system will be added to the 3/10 through new software.

The announcement removed two major compatibility problems that had existed in the IBM equipment arsenal.

The new 3410 system provides a tape capability to the 3/10 for the first time and adds a slow tape system to the 360 and 370 series.

The 3410 has a new design which mounts standard tape reels horizontally instead of vertically. The tape system eliminates the need for a separate controller by incorporating control circuitry into the 3411 drive unit.

Up to six drives can be attached to the 3411. Only four can be used with the 3/10. A transparent sliding cover similar to that on a roll-top desk provides access.

The 3410 system can read or record at 20K, 40K, or 80K byte/sec. This is considerably slower than the 3420 system, which will handle 120K, 200K or 320K byte/sec. The new system can handle 800- or 1,600 bit/in. at speeds of 12.5, 25 or 50 in./sec.

Access time is 15, 12, or 6 msec depending on speed. The 3410 is limited to handling 9-track tape.

The tape system operates with the 3/10 via a special tape attachment feature that costs $75/mo or $3,150, IBM said.

The 3411 control drive leases for $535/mo to $855/mo depending on features. Purchase prices range from $22,650 to $36,200.

Additional 3410 system drives cost $240/mo to $385/mo, or $10,200 to $16,400. First deliveries are scheduled for fourth quarter of 1972. The 3410 system can operate with the 360 Model 22 through Model 50 and the 370/135, 145, or 155.

Small Cards for Big CPUs

The 2596 card read-punch will allow 360 and 370 CPUs to read 96-column cards at 500/min; punch at 120 card/min; or print three lines of 32 characters at 120 card/min.

The 2596 has an optional interpret feature that allows

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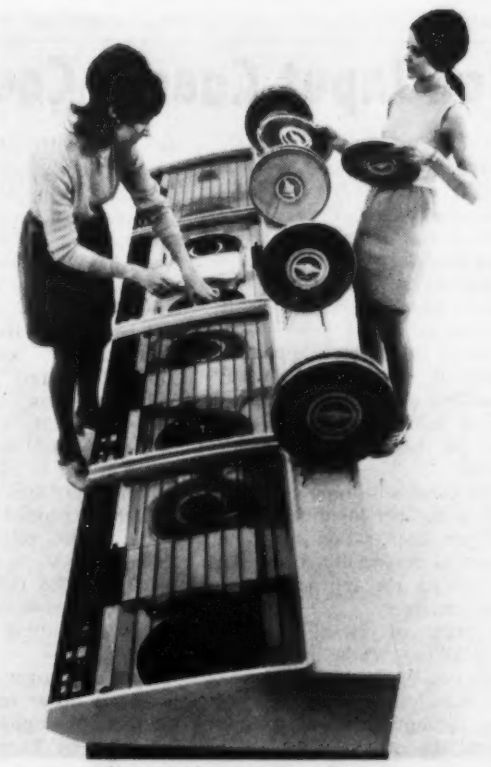

IBM 3410 Magnetic Tape Subsystem

Users Seek Answers, Statement of Policy From RCA President

By Michael Merritt
Of the CW Staff

MIDDLETOWN, Pa. – After waiting fruitlessly for two weeks for any information, the RCA Computer Users Association (CUA) last week appealed to RCA for immediate assurance that RCA will clarify the support situation at the users meeting in San Francisco Oct. 25.

The association also asked for quick affirmation that RCA will continue to support the group, and for a complete list of RCA users.

Letter From the Users Group

In a letter to RCA President Anthony L. Conrad, David L. Rau, association president, said, "To date, your customers have been unable to obtain any official commitment from the RCA Corp. concerning hardware deliveries, software support for systems now in the field, development and release of anticipated software, availability of documentation, training, and confirmation that previously-agreed-to commitments would be honored."

Rau said he realized "it may take several more weeks"

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Bad Input Causes Court Errors

By Edward J. Bride
Of the CW Staff

PHILADELPHIA – Time solved the transition problem from manual to computer record keeping, but the local municipal court system is still smarting from thousands of errors, blamed on the computer, after it sent out summonses or warnings to people who had never been here.

One person reportedly received 140 traffic violation tickets, despite the fact that all his company's automobiles were located in McKeesport, nearly 300 miles away.

Local sources said two sets of license tags had been issued: one to a "body shop" in Allegheny County, and another to a used car dealer here.

Chief Magistrate John P. Walsh said the "body shop" was exonerated, but only after the Lieutenant Governor intervened in the case.

Under a year-old system, the state Department of Motor Vehicles (DMV) maintains registration data on its twin IBM 360/50s in the state capital, Harrisburg.

The Philadelphia traffic court records the registration number of violating vehicles, compiles the list on magnetic tape using a 360/20, and twice a week sends the tape to Harrisburg.

At the capital, DMV matches violating tags to name and address, and returns the tape to the City of Brotherly Love. If a driver does not pay a ticket within eight days, he is mailed a warning, warrant, or summons, depending on length of time and number of violations.

Judge Walsh told CW a change in registration renewals complicated the break-in period for the system.

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AT&T May Go Along With Data Certification Program

By Ronald A. Frank
Of the CW Staff

NEW YORK – AT&T may go along with a data equipment certification program that could eliminate Direct Access Arrangements (DAAs) and make life simpler for users of noncarrier data sets.

Although certification was not officially favored, statements made by William Quirk, AT&T's marketing director for data communications, indicated the Bell System is leaning in that direction.

Quirk's comments were made in response to questions from communications users attending last week's conference on data communications and business strategy held here by Auerbach Corp.

In another area of importance to users, Ted Sorenson, former adviser to the Kennedy administration, called for the data processing and communications industry to initiate legislation that will safeguard personal information files "before such a law is forced" upon them.

The AT&T reference to certification came after a talk by Samual Bonsack, AT&T vice-president. Although he shed little additional light on Bell's plans for increased data services, Bonsack did say AT&T is considering separate rates for the installation and maintenance of equipment.

In response to a question whether Bell would allow the use of non-AT&T DAAs on the phone network, Quirk said if a certification program is developed and approved by the FCC, there will no longer be a need for DAA units.

Quirk added that Bell might also consider using DAAs supplied by non-Bell companies at certain locations.

Commenting on Bell's plans for competing with the new specialized carriers such as MCI and Datran, Quirk said, "A route pricing concept is now under deliberations and will be announced fairly soon."

AT&T should be free to price such services at any level required to meet its competitors, he added.

Privacy Agency?

Sorenson warned conference attendees, "Attacks on the DP industry as being a threat to privacy are just beginning." It might be necessary, he said, to create a new government regulatory agency to assure that privacy is maintained.

MCI was represented at the conference by its vice-president, William McGowan, who said the specialized carrier has proposed to use small-dish earth stations in cities to connect its planned satellite and microwave systems. MCI will be serving 32 eastern cities within the next year, he said.

Datran Vice-President David Foster noted the carrier has already spent $10 million to implement its proposed network.

Although based on "proven technology," Foster admitted that the elements of Datran's proposed system had "never been combined" into a digital data system.

Richard Sonnefeld, an RCA vice-president, predicted the biggest growth area for data communications will come with the development of a new "disciplined terminal."

Simpler in concept than the existing intelligent terminal, such a device will cost under $2,000, Sonnenfeldt said. Asked to comment on RCA's data plans, he said, "We will be heard from," but refused to elaborate.

Plan Ahead to Control Loss From Fire

(Continued from Page 1)

Details would depend on the "specifics of the operation," he suggested, but might include the following:

- Termination of on-going data processing tasks by rewinding magnetic tapes, and clearing source documents from card readers, Micr and OCR units.
- Demounting tapes and disk packs, protecting them either by putting them in a storage vault designed specifically to protect magnetic media, or by removing them to an off-site location. "Prudence suggests that both alternatives be available to meet any situation," Jacobson said.
- Gathering and protecting source documents, input card decks, log books and key documentation.
- Protecting hardware against water and smoke damage. This is most easily done by covering equipment with plastic sheeting.

Cabinets must be powered down, and air circulating fans turned off, since the plastic will stop the flow of air, he added.

- Shutting down "air handlers" which could introduce smoke from other areas, but at the same time leaving exhaust units operating.

This step includes closing fire dampers in ducts, assuming that the arrangement of and action of air handlers and ducts has been analyzed, and that needed controls have been installed, he cautioned.

- Disconnecting electric power from all electric units. If time permits, this can be done at the circuit breaker panels.

Each breaker, Jacobson asserted, should be clearly marked to indicate exactly which units it powers. Then, individual units can be turned off without affecting other equipment.

Alternatively, it should be possible to cut off all electric power to the area, with a single emergency power disconnect button located near each exit door.

'Minimize Damage'

The loss control team leader should decide which of these measures can be taken, Jacobson continued.

If the fire is elsewhere in the building and evacuation is ordered, using all these measures will "minimize damage to the facility" as well as the time required to recover, he added.

This, of course, presumes again that sufficient time is available, he conceded.

By analyzing the "particular needs of the DP facility, devising specific loss control measures, providing needed facilities and training the loss control team in their use," he said, the "team leader" will be free to use his judgment during an actual emergency, confident that his orders can be followed without confusion.

Tests and drills must also be conducted in a DP facility, Jacobson proposed, just as in any business environment.

For users who cite cost considerations as objections to full fire protection, Jacobson said a "catastrophic fire could cause major losses far beyond the cost to restore the DP facilities."

Lost orders, delays in meeting competition from new products, and loss of accounts receivable are just a few possibilities, he added.

Bad Input Causes Court Summons Errors

(Continued from Page 1)

Last spring, all tags were to expire, but the deadline was extended two months because of difficulty in updating the Harrisburg files.

Officials at DMV either were "unavailable" or refused to discuss the problem.

Part of the problem apparently stemmed from errors in keypunching owners' cards, according to Johnson White, DP manager for the Philadelphia Traffic Court.

The cards are supposed to contain a number identical to that on the license tag, which accesses a registrant's name and address in the Harrisburg files, White noted.

Because of these conversion difficulties, White said, there were two or three months when two vehicles had identical license tags, except that one was for 1970, the other for 1971. The expiration date was extended, due to the difficulties, he added.

Aside from duplicate tags, for which no explanation has been offered, the erroneous keypunching on the owner's cards could have been detected by individual owners, if they had only checked that the card's number matched that on the tag.

An additional problem of issuing "temporary" dealers' tags and permanent drivers/owners tags with identical numbers was only recently solved, when a "T" was prefixed to all the numbers on temporary tags.

Walsh explained that policemen would often omit the "temporary" notation when writing traffic tickets, and the computer search would identify the permanent-tag owner as the violator.

Other "normal" conversion problems occur to this day, in the form of sloppy handwriting, judgment by keypunchers, and even alteration of traffic tickets, Walsh said. Policemen sometimes write an "S" to look like a "5," for example, while other people handling the paper accede to requests by friends to alter tickets, such as crossing a "1" to make it look like a "T," he added.

The computer can't solve that type of problem, he said.

Perceiving one result of these problems, Walsh stated, "Once you have a mistake in the computer, it keeps repeating until it is corrected."

Citizens and court officials blamed the computer for all these input troubles, but the Philadelphia *Inquirer* editorialized: "... blaming traffic tickets on mechanical quirks instead of human negligence has all the appearance of copping a plea. Someone, somewhere, must be inserting those wrong license numbers in the computer in the first place."

But Harrisburg wouldn't say who.

Tape, Mini Cards for IBM

(Continued from Page 1)

data to be printed at the top while cards are being punched. The card unit will cost $845/mo, or $29,575. The interpret option is priced at $150/mo or $5,250.

CRT for 3/10

The 3270 CRT system will operate with the 3/10 through the binary synchronous communications adapter, IBM announced.

The capability will be added in the third quarter of 1972 via modifications to the system control software. The 3270 compatibility (without the hardware) will be available free.

IBM also said the System/3 Cobol and Fortran compilers have been moved up two months to earlier release dates. Cobol will be ready next April and Fortran is scheduled for June.

DP Moniters Parishs' Collections

CINCINNATI, Ohio – A computerized collection system is being initiated in Cincinnati by 10 Catholic parishes. Under the new system, each parishioner puts his offering into a computer-readable personalized envelope, which is then transported to the bank for processing.

Printout of Contributions

Contributions are credited to the parish account, and a printout is made for the pastor, showing the total offering and each individual contribution. Quarterly statements are provided to contributors for tax purposes.

The system, developed by Praxides, Inc. of Princeton, N.J., allows centralization of parish funds, enabling participating parishes to invest and earn income on surplus funds.

Centralizing the funds costs no more than current collection accounting procedures and eliminates much of the administrative workload, Archbishop Paul F. Liebold of Cincinnati said. It just makes good business sense to realize a return on idle funds, he added.

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The big change in Hardware Monitoring

Employment Takes a Better Turn

By E. Drake Lundell Jr.
Of the CW Staff

PALO ALTO, Calif. – The demand for computer professionals is now rising, but unemployed members of the computer fraternity may not get the benefits as those employed begin "job hopping" again.

Source EDP Inc. reports the employment picture for computer people is improving in the "majority" of 11 cities it recently surveyed, but cautions that "the possible effects" of the recent RCA decision to leave the computer field "are not yet known."

At the same time, the placement firms' survey indicates computer professionals are better off than those in some other fields. Unemployment among computer people was 1.3% on the average, far below the national average of 3.6% for all white collar workers, the firm said.

"After 12 months of layoffs and six months of no activity, demand for computer professionals has now returned and is increasing daily," said M.R. Parr, Source EDP president.

"Unfortunately," he added, "for many of those represented in the unemployment statistics, the demand is for solid successful commercial experience which is not the general profile of those now unemployed."

In support of that theory, he noted the average unemployed computer professional has been out of work for 8.8 weeks as of Sept. 1, while a similar study two months earlier showed the term of unemployment at 7.1 weeks. This indicates, he said, that most of the unemployed are remaining that way despite a significant increase in hiring.

Minneapolis has the lowest unemployment rate, 0.3%, followed closely by Los Angeles and Detroit with 0.5% each, the survey indicates. Philadelphia, New York, San Francisco, Chicago and St. Louis have unemployment rates that range from 1.8% to 1.2% in the computer profession.

Currently most computer people with jobs are not seeking new positions, but it is not certain that this trend, which would force demand to be met from the pool of unemployed, will continue, Parr said.

The highest rate of unemployment among computer people is currently found in the Dallas area, 3.1%, closely followed by Palo Alto, 3%, and Atlanta, 2.5%.

Ombudsman Plan Received With Caution

By Robert L. Glass
Special to Computerworld

SAN FRANCISCO, Calif. – The ACM Ombudsman program was received cautiously by a group of Northwest Region Association for Computing Machinery officers at a recent meeting.

None of the 25 officers were ombudsmen and no chapter president was able to offer more than cautious optimism for his chapter's participation.

The Ombudsman program is an attempt by ACM to establish, at the local chapters, an action-oriented sense of public responsibility for the application and misapplication of computers.

ACM Executive Director Gordon Smith, in tracing the historical development of the program, mentioned ACM's investigation of the Clark Squire case and the course "Peaceful Sabotage of Computers" at Syracuse University. Squire is a computer programmer and a Black Panther whose arrest and detention on a conspiracy charge received national attention last year; the course was dropped following ACM's study.

The program is still experimental, and there are no guidelines yet established for local ombudsmen.

Smith stressed caution, due to possible legal problems caused by overzealous investigations and accusations. Positive recent achievements of some local chapters are:

- The Indianapolis chapter initiated a successful program explaining the fundamentals of data processing to the local Better Business Bureau
- The Detroit chapter investigated a disastrous computerized election, then produced and distributed a 60-page document describing what not to do to other election boards
- The Los Angeles chapter is producing a consumer-readable document on cycle billing for the local Better Business Bureau.

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Univac Says New CPU Is Not Mini, Yet 16-bit Unit Costs $16,000

ST. PAUL, Minn. – Univac has announced a 16-bit computer, the 1616, that it says will compete with "many of today's small and medium scale computers." The 750 nsec cycle time machine has the specs of a minicomputer, but Univac contends that "its capability far outstrips what is generally termed a minicomputer."

The $16,000 CPU is structured around a common data bus and offers high modularity. It has 60 registers, and can use from 4K to 64K of directly addressable 16-bit words. The 40 instruction repertoire can be modified to yield 200 operations. There are four instruction formats, as well as multi-class and multi-level interrupt logic.

The 1616's software includes an assembler, Fortran compiler, macro assembler system monitor, diagnostics, and applications software.

Originally designed for the Navy, the 1616 appears to be suited for real-time applications.

RCA Users Seek Policy Answers

(Continued from Page 1)

for RCA to decide the answers to the questions, and offered Conrad "an opportunity to present a lucid policy statement at the national RCA CUA meeting. . ."

Conrad's office had not received the letter as of Wednesday, Oct. 6. The letter was mailed Oct. 4.

Rau also told Conrad that the user group had developed "plans to insure its survival. . ."

The letter "represents an effort on the part of your customers to bring order out of chaos," Rau wrote. RCA's departure from the industry "will have far reaching effects on every manufacturer of business computers and on every user as well. It is no less than a tragedy for the entire industry," he added.

Rau's letter goes on: "I am sure you recognize there is no industry where customer confidence plays as large a role as it does in the data processing industry.

"Unfortunately . . . this loyal customer base . . . chose to cast its lot with RCA, many times in the face of extreme pressure to chose an easier alternative . . . Hopefully the forthcoming plan will be worthy of the most trusted name in electronics."

News Wrapup

WIN Data Needs Improvement: GAO

WASHINGTON, D.C. – The General Accounting Office has recommended that the Department of Labor improve its computerized management information system for its Work Incentive Program (WIN) so that it will provide accurate and complete data on program operations, costs and benefits.

WIN, budgeted at $328 million for its first four years, was designed to provide welfare recipients under the Aid to Families with Dependent Children (AFDC) program with training and services necessary to move them from welfare dependency to employment at a living wage.

GAO recommended to Congress that data be developed "consistently both on a nationwide basis and on individual projects and should be used for managing and evaluating the effectiveness of WIN operations and for developing estimates of appropriation needs. The complete results of the program cannot be determined readily because of significant shortcomings in the management information system," the agency added.

DP Goods Included on Soviet 'Wanted' List

LONDON – One of the items on the Soviets' list of "things to get abroad" is apparently information on computers. The recent expulsion of Soviet officials here reportedly involved efforts to obtain data on computers and electronics used in conjunction with the Concorde aircraft.

And one of four Soviet agents asked to leave Britain before the latest round of expulsions specialized in obtaining embargoed goods. He apparently attempted to bribe engineers to give him computer equipment.

Hospital to Moniter Patients' Drug Intake

PALO ALTO, Calif. – A computer is being used to protect hospital patients from potentially dangerous combinations of drugs administered at the Stanford University Hospital here.

Doctors are automatically monitoring all drugs dispensed to patients, and eventually the computer will issue an alert each time a newly prescribed drug could interact undesirably with a drug the patient is already receiving, said Dr. Stanley N. Cohen, program head.

Paperwork No Boon From Alaska Land Boom

ANCHORAGE, Alaska – Increased subdivision of land in the Anchorage borough has mushroomed into mounds of paperwork for the various civic departments involved in property assessment and taxation. Use of a computer to centralize all records for the borough's 100 square miles of privately owned land has been recommended.

As the system currently works, there is little interdepartmental communication, and each unit compiles its own set of records. "We'd have to hire 25 new people just to maintain reasonable records and communications. The system will collapse soon from the sheer weight of volume – it's conceivable we could lose control entirely," said Borough Finance Director Ed Pysher.

Seattle Area Punchcard Vote Proceeds Smoothly

SEATTLE, Wash. – This area's first experience with automated voting drew rave notices from the local communications media.

A pilot punchcard voting project in suburban Bellevue and Mercer Island went off without a hitch, when used during the September primary.

H.R. Nichols, who headed the punchcard program for the county, reported only minor procedural problems with the system, with no breakdowns or trouble calls. There was only one card read stop in processing over 10,000 ballot cards, he added. The cards were manually inspected before being read, however.

Former DP President Killed in Crash

AARSELE, Belgium – Benjamin Kessel, founder and later president of Computer Control Corp., and his wife were killed in a British European Airways plane crash near here last week.

Kessel received his BSEE from Texas Tech and SMEE from MIT. He worked in circuit design for Raytheon's computer laboratory in the 1940s, leaving in 1953 to help found Computer Control Co., of which he was named president in 1959.

After Computer Control Co. became the Computer Control Division of Honeywell in 1966, he was named vice-president and general manager of the division. He later served as director of product planning in Honeywell's international operation and most recently as president of his own management consulting firm.

Hesitate to Ask VD Questions? Ask Computer

MILWAUKEE, Wis. – University of Wisconsin students having questions about venereal disease can soon receive answers from an impersonal computer terminal. The computer will ask the kinds of questions a doctor would ask, and is programmed so the answer to each question typed in determines what the person is asked next, said instructor Lawrence Van Cura of the university's Madison campus Department of Medicine.

The "patient" will be advised by the computer of alternatives such as, "It's unlikely that you have VD," "We can't rule out the possibility of VD" or "It would be advisable for you to consult a doctor to get a definitive diagnosis."

Econometrics as Much Art as Science: Otto Eckstein

By Michael Merritt
Of the CW Staff

LEXINGTON, Mass. – Otto Eckstein, a former member of the Council of Economic Advisors and economics professor at Harvard, was watching television on the night of August 15. When the President finished his announcement of the New Economic Policy, Eckstein called up the boys and went down to the computer.

The "boys" are the staff of Data Resources, Inc., a company that offers economic modeling and forecasting services

DP Profile

on a time-shared computer system. Working through the night, they had a first commentary out to their customers Monday morning, and a new prediction model out by Tuesday.

And first thing Monday morning, time-sharing users of DRI's simulation model of the U.S. economy were on-line, using the DRI model for input to their own computerized simulations.

Eckstein believes that the new policies will work – though he has some reservations. It "substantially improves the outlook for the U.S. economy," Eckstein said. He added that some wage-price controls must remain in force beyond November if there is to be any real effect.

Potential Problems

The President's proposed investment tax credit won't have an immediate effect, however.

The DRI staff feels that in its suggested form – 10% the first year and 5% after that – it "could inject serious instability into the economy" in mid-August 1972. They have assumed that Congress will modify the proposal so that capital purchases won't have to be made in such a short time.

On this basis, their computer model predicts that the investment tax credit will have its largest effect on the GNP in 1974, boosting it by $12.8 billion (1958 dollars.) In 1974 this would have the effect of reducing the unemployment rate by 0.5%. In 1972 the credit will increase the GNP by $4 billion, and in 1973 by $10.3 billion (1958 dollars).

DRI's computers maintain an extensive economic data base, their own 400-equation simulation model of the U.S. economy, and the model prepared by the Wharton School of Business as well. Yet Eckstein is unassuming about the virtues of computer modeling.

More Details Available

"I can't say a computer model's forecast is better than an informal forecast," – one made by an unaided economist at his desk – "but it does give you more detail. An informal forecast can only give you the GNP while the model provides you with much more information," he added.

"We, for example, did well in 1969, but we were mediocre in 1970. In 1971 we were dead right," Eckstein said.

"The computer gives you greater and faster interchange of information, and it also lets you play around, try out a change to see what effect it will have."

Data Resources makes its money by selling access to the data and models to large firms and the government. It also provides both technical and economic consulting services. General Motors, for example, is a DRI client that has a computer model of itself. The GM computer can go on-line to the DRI computer and merge the simulations, using national economic data to determine the future of GM.

Model-to-Model Talk

Eckstein said that this was one of the most interesting aspects of the business. Currently the GM model only takes information from the DRI model; there is no feedback, yet, to determine what the effect the GM decisions would have on the national model. Data Resources, however, is developing this capability, and since its clients account for a large percentage of the GNP – they include the Department of Defense and the Office of Management and Budget, as well as many large corporations – the results may be very interesting.

Clients can supply their own coefficients for the equations in the model, and use their own theory as well.

Corporations use national economic models for a number of reasons, Eckstein said. In creating corporate plans, the models provide input on trends and cycles to modulate sales projections.

In large companies, use of the model imposes consistent assumptions on different divisions during the planning process.

Otto Eckstein

It also aids predicting the success of a new product.

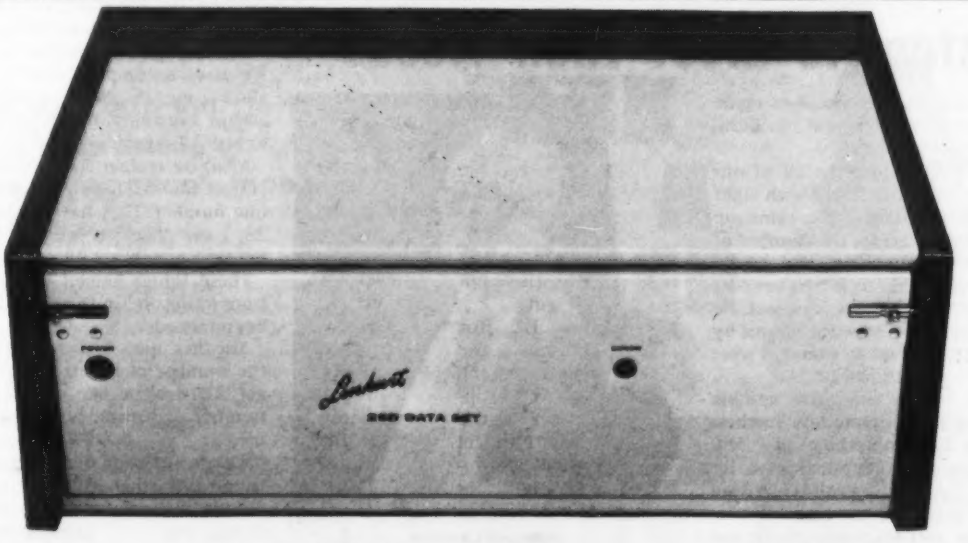
In acquisition analysis, Eckstein said, the model also helps determine how well a company is doing in relation to the entire economy or its particular industry. The same holds for portfolio analysis.

Eckstein is naturally concerned with the quality of input data, and is appropriately sceptical of it. "All economic data is incorrect to some degree," he said. "There is no single source of correct information." He added, though, that he considers durable goods orders as significant and fairly reliable statistics.

"The quality of your data base is certainly essential to your success," he said, "but you have to look at the total data effort as you would look at medicine.

"Doctors take tests and readings and interpret them, and the tests and readings may not be wholly accurate and consistent. They do provide trends and indications, however, and a doctor does try to make his tests as accurate as possible.

"Econometrics is like this – still as much art as science."



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Keypunch Replacement Forum

Users Discuss Configurations, Software, Sites, Morale

The availability of the right software is one key to choosing the right keypunch replacement equipment, according to users who participated in *Computerworld's* User Forum last summer. The consensus was that the manufacturers are well versed in hardware technology, but software can present great problems.

In Part II of the four-part series, users also discuss the effect on morale when former keypunch operators are assigned to an input system containing a minicomputer.

Last week, in Part I, users said they justified keypunch replacement primarily on the basis of throughput improvements and other factors and that cost was often the last, although a major, factor.

In choosing vendors, the users said the location of maintenance personnel was a major consideration. They also felt it was important to be able to see the equipment operating at user sites.

While users did discuss their own equipment and necessarily mentioned brand names, the purpose of the forum was to discuss the reasons for and the problems presented by keypunch replacement and not to evaluate equipment. Not all brands were discussed, and the features of some of those mentioned have been changed since the forum was held.

To make the discussion as balanced – and as lively – as possible, CW invited users of a variety of equipment, two of whom were currently in the process of evaluating keypunch replacement equipment. CW Staff Writer Edward Bride acted as informal moderator.

Part II-1: How the Users Choose A System to Meet Their Needs

MORLEY: How was the decision made on the number of stations and the number of terminals?

WINSHIP: We went back to all of our source documents and came up with eight different functional areas. We came up with the number of cards, the number of columns we were punching, and everything else. We gave this to all the vendors that we invited to bid on our project. So they actually had very specific figures by shift, by format, how many punches were made in which applications.

This research, by the way, gave us a big plus, even if we hadn't gone any further. We found we had something like 580 formats going into our keypunch area. By the time we did our consolidating, we ended up with about 108 or 110.

BABIN: When you did your costing, did you do it on a one-for-one basis? One terminal versus one 029?

WINSHIP: No, we didn't do it that way. We had about nine vendors we gave our proposal to, and said, "Here is our workload. Now what do you propose to take care of this workload and what will the cost be, etc." We didn't figure at all as to how many operators we had, or how many 029s we had.

BABIN: What has it proven out to be?

WINSHIP: We anticipated and we received about a five-for-four ratio. It's tough to measure though, because if everybody's data entry area is like mine, the thing's in a constant state of flux.

BABIN: True.

WINSHIP: You have a hard time at any given point saying my workload is such-and-such and will remain that.

BABIN: I sent out 13 requests for proposals and got back 11. And I've narrowed it down to five. I found that all of the vendors can maintain the hardware regardless of whether its 5 to 4, 1 to 1, 2 to 1.

My biggest problem right now is the software capabilities. I know that some users have had problems in software. Mr.

David Tierney

(CW Photos by V.J. Farmer)
Everett Lawton

Lawton has a Redcor. They have 100 man-years of software behind them, is that right?

LAWTON: Redcor was originally a software house. They expanded and bought this small computer company, Penta, which now has been merged with Redcor.

BABIN: Why did one choose CCS and one choose Redcor? What made you decide for your equipment and not his? And vice versa?

LAWTON: In my case, I took four of what I considered to be the top at the time. I talked to them all and got proposals from all of them. In my first go around, I did nothing but look at software. I cared less about the equipment or anything else. In my opinion, when I got through I felt that Redcor's software was better than any of them. This was my opinion.

I then went around the same route and looked at equipment. I do not like the boob tube [CRT]. This was my first stipulation. You're not going to gain as much time with a girl keypunching and looking at that boob tube all the time. If she hasn't got a boob tube, she can look at documents and "go to it." This is my opinion. There are a lot of people that don't feel this way.

WINSHIP: I personally feel that the software is one of the reasons that a small company can compete against the Honeywells, the IBMs, the CDCs in this area. How much software do you need for normal data entry applications? You probably know as well as I do that quite a few companies are getting into this with firmware as opposed to software. They are actually coming up with the batch totals, and the check digits and all the rest of it with hardwired entry systems.

I think it's an area where the small guy can compete well, because I don't think he has to worry about the enormous operating systems and enormous overhead that you get with OS. A small guy can customize software for specific applications for the customer he is looking at. An illustration: We have a big freight bill application, so one thing that we were very interested in getting was a specific piece of software to do a good job of verifying freight bills. We did get specific software that fits the freight bill application exactly.

TIERNEY: I have looked at Redcor's software, and it is very good and very extensive. But some companies, it seems, have a philosophy of "let's get the machine out there and get ourselves in the marketplace, and then we'll start building around this basic machine, and developing our software, and further refining our hardware. Rather than wait until we have a Cadillac to put on the market, we'll put a Ford on the market and build around it."

LAWTON: One of the reasons why I looked at software was to speed up production on the computer. But I looked for certain things in software.

For example, we service 12 companies. We have a company number. Key-Logic allows me to build a table and only accept company numbers for these particular 12 companies.

Also, on certain transactions, one transaction has to follow another. If I have one number 27, I have to have a number 28. I can check to see that I have my 27 before I punch my 28.

These things helped us in getting these transactions in on the same day they were keypunched.

Another nice feature is that I can get the number of keystrokes per hour. I can get keystrokes per day. I can get the number of errors. Software did that for me.

We always kept our keypunch load and found out what each girl was doing. We did it by weighing the cards. Now it comes out on a printed log, and I just post it.

BABIN: While I agree on the need for good software in the long-range picture, do you need all this for the immediate

Robert Babin

Arthur Morley

transition from keypunch to key-to-disk? Can't you just go right in, and as you progress and get used to the hardware, make more, better use of it?

LAWTON: Take as an example one thing we did. I have one bad application, and that's customer accounting. One slip of paper may have five different transactions on it. I used between 16 and 18 girls a day on keypunch and verify equipment. I decided to put customer accounting on Key-Logic first, and I ordered 12 terminals. It took me about a week and a half to get the keypunchers [trained] on Key-Logic.

Since then, I have added three more applications and four more terminals. I am in the process of ordering now for more applications.

CW: Mr. Lawton, you mentioned you don't like the tube. Is that a function of the type of applications you have?

LAWTON: I said it's my opinion. I feel a keypunch operator, if she has to look at a boob tube, isn't looking at the document. Her head would be going back and forth if she is following a format [or cursor] on that boob tube. I guess in some cases that isn't necessary. But I do think that a girl should be looking at the document at all times. Her fingers should be working the keyboard, and she should never [have to] look at the CRT. And I think your throughput would be more without the boob tube than with it.

BABIN: Not only that, on your so-called boob tube they have a cursor that the girl has to follow. There are some girls that could punch faster than that cursor can go. So if there is an error, she has to wait for the cursor to catch up. This is why I'm against a CRT.

MORLEY: It's interesting that he should mention that boob tube. When I started my investigation of data entry equipment, one of the first things I did was to exclude any device that had the boob tube attached. If you have a data

(Continued on Page 7)

Meet the Participants

ROBERT BABIN, data input manager, American Mutual Liability Insurance Co. His installation includes a 360/40, an H-800, an H-2200, an H-8200, 17 keypunches, nine verifiers, two Mohawk Data Recorders, three Honeywell Keytapes, and a Farrington 3030. He was one of the two users seeking more information to help him make a purchasing decision.

EVERETT LAWTON, manager of data processing operations, New England Power Service Co. His installation includes a 360/50, a 360/40, a 7010, two 1401s, a 1460, 22 keypunches and verifiers, and 16 Redcor Key-Logic (key-to-disk) stations.

ARTHUR MORLEY, assistant chief, Bureau of Analysis and Processing, Massachusetts Department of Corporations and Taxation. His installation includes a 360/40, a Univac 9200, and 113 keypunches and verifiers. He was the other user seeking more information to help him make a purchasing decision.

SAMUEL NOAH, manager of data processing, M&M Transportation Co. His installation includes a H-200/1250 and a Consolidated Computer Key-Edit eight-station system.

DAVID TIERNEY, systems engineer for hardware evaluation, State Street Bank & Trust Co. His installation includes a 370/155, a 360/50, two 360/40s, two 360/30s, 27 keypunches, 13 verifiers, and a CDC 915 page and document reader.

LAWRENCE WINSHIP, manager of data processing, GTE Sylvania Lighting Products. His installation includes two 360/40s and two Consolidated Computer Key-Edit systems (one with four stations and one with eight stations).

How Users Choose a System to Meet Their Needs

(Continued from Page 6)

entry operation and the operator is looking at the boob tube, she obviously is not entering data.

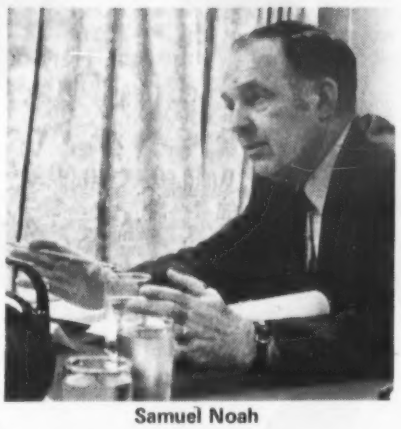
However, we do a lot of batch work, too, and a lot of name-and-address work. On the batch, when we are going about balancing, I would think that the boob tube would be a great help.

On the name and address stuff, I found that most of the errors seem to be in the fielding. If you had a boob tube it seems to me that you would have less of that kind of error; consequently, you wouldn't have to do any verifying of names and addresses.

In any event, based on these two factors, I did an about-face on my evaluation and did include boob tube type devices.

LAWTON: You are saying that the girl could keystroke the name and address and then visually check it.

MORLEY: Yes, rather than key verifying it.



Samuel Noah

LAWTON: Good point.

BABIN: If an operator is going to keypunch or keystroke records like names and addresses, and then visually verify them, why not have her type them on paper and use OCR input, rather than key-to-disk?

TIERNEY: That's a good point. In our operation at the bank, 90% of the information we have is numeric. We do have name-and-address type applications, but they are so small that I tend to agree with Mr. Lawton. If the use of the boob tube is a small percentage of your work, I would choose the type of device that did not have the tube.

TIERNEY: I would like to address a question of Mr. Morley's: How to arrive at a decision on how many key-to-magnetic devices to use to replace keypunches.

One of the ways we used was to figure out the average number of hours that every one of our employees put in, rated them at 6,000 strokes per hour, the normal for keypunch operators. Then we figured 7,800 strokes per hour for a key-to-magnetic unit, a 30% increase, which I think is conservative. I think most people you talk to will claim their throughput is up above that. You'd work backward from this point, to determine how may stations and operators are needed for the same workload.

Lawrence Winship

Part II-2

Replacement Affects Morale, Staff Needs

TIERNEY: Have any users found that replacing keypunches with the more sophisticated key-to-disk or key-to-drum has helped morale?

NOAH: It helped very much in our case. They liked it from the first time I showed them a picture of the system, before I even thought of ordering it. We were using Mohawks and the keyboards on the Mohawk and the Key-Edit are very similar. They went to school, and took to it at once. One morning of the course, they came back and were able to use it.

TIERNEY: Did you get any indication from the girls that now that they were sort-of isolated, each operating her own machine, they felt part-and-parcel of this minicomputer that's controlling the work? Or does that – or the looks – have anything to do with it.

NOAH: Well, they do like the looks of it. They can see the computer. They know they're going through a much better piece of hardware.

TIERNEY: Did it give them more pride in their work to know this?

LAWTON: I'd say so, but I wouldn't want to stress that point too much.

WINSHIP: I think they recognize there is the prestige factor.

LAWTON: Are you paying a premium for operators?

NOAH: I am not. Somebody mentioned the cost of training keypunch operators, and I think that is just as true now on Key-Edit. If they had no knowledge of either, they could learn the Key-Edit system as well as they could learn keypunching.

MORLEY: This was going to be one of my next questions. You all mentioned in your reasons for going to data entry equipment that finding trained help for a keypunch machine was one of the factors that led you to data entry. How much more difficult is it to find trained help and what do you have to do now to train them?

WINSHIP: Fewer girls, number one. In our case, we're looking at 20% fewer girls at all times. But I imagine that our problems of getting the new girl will be just as difficult as it was before.

We just picked up a very senior trained girl on the 029, 059, and I'd say within two days' time she was every bit as capable on the keying portion as anybody else. She still has to learn something about the special switches, but in a couple days' time she was already up to the rate on her keying as the other girls.

TIERNEY: Do you find that, because girls tend to like the key-to-magnetic devices more, that the turnover is less?

(Continued on Page 9)

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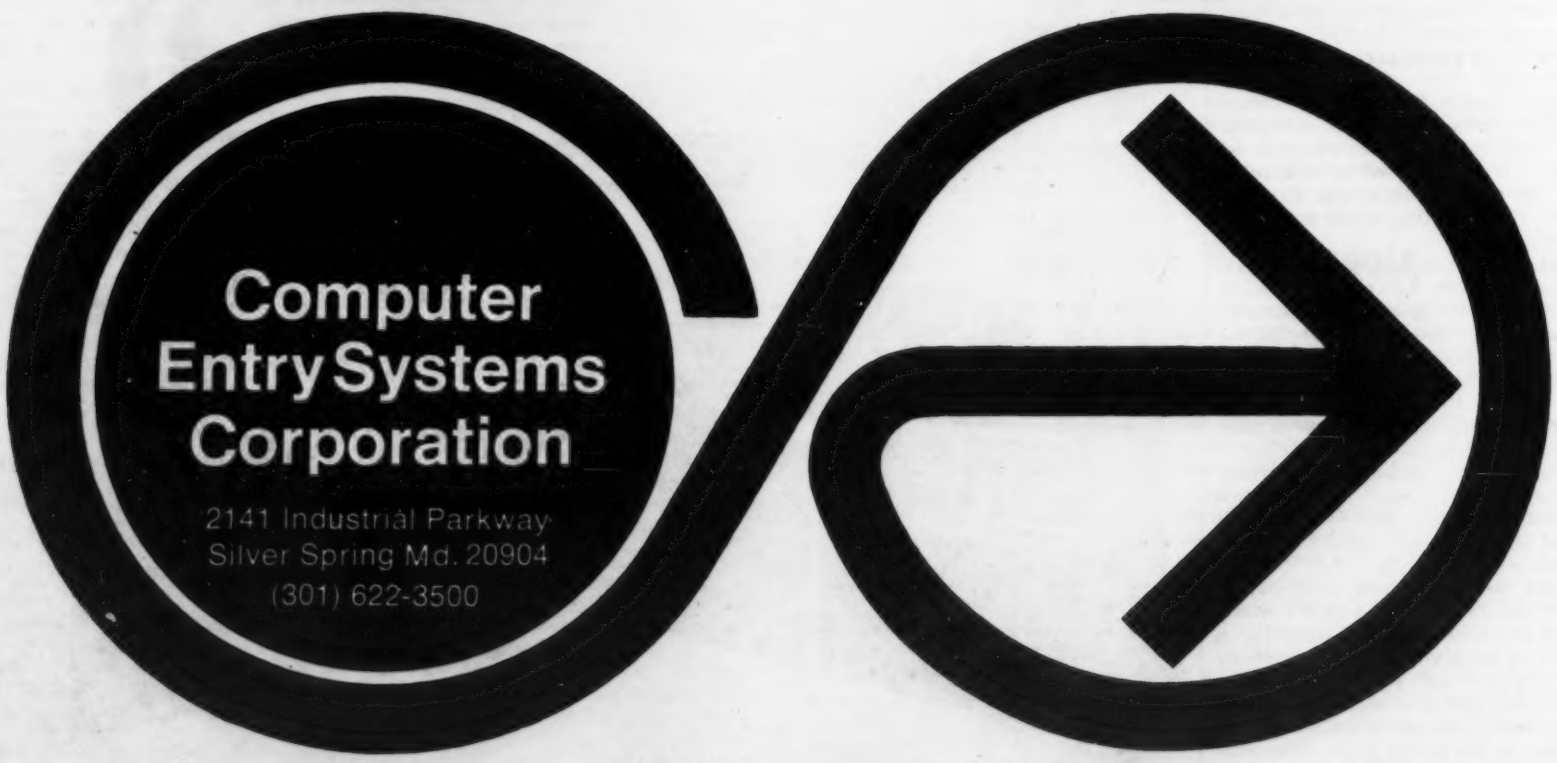

See us at BEMA. Location 5 NP, 2nd floor, Business Equipment Manufacturers Association Show, New York City, October 25-29.

How Replacement Affects Morale, Personnel Needs

(Continued from Page 7)

WINSHIP: I feel so, but I don't really know.

LAWTON: We have a big problem with turnover, but you still only have to look for a keypunch operator. Believe me, in a day, or a day-and-a-half, you're getting production out of that person on a key-magnetic device.

MORLEY: Do any of you have any peak-time applications where you would be using temporary help on this type of machine – and how difficult is it to find temporary girls?

LAWTON: I can't use them. I have to work overtime.

WINSHIP: My casual labor is just like a permanent employee only they work a few days a month, a few hours a day.

MORLEY: Then you have no turnover problems.

WINSHIP: No.

MORLEY: Did any of you have any site preparation costs?

WINSHIP: Ours was minor at Sylvania. Consolidated is doing better now, but they should have had a gal on their design team to start with, because they didn't have space for the gal's extra shoes and handbags, their candy, etc.

NOAH: So they came out with new furniture. For $250 you can have the old furniture replaced with the new.

WINSHIP: That's what I'm doing because I think it's important. But I think a lot of companies initially did a better job on the design of the equipment, which is important to the girls.

MORLEY: You didn't have any increased air conditioning requirements?

NOAH: We got our equipment in September [1970], and we did have some trouble with air conditioning for the first two or three weeks that we used it. Since fall was right around the corner, we decided to go ahead with it. After that we didn't have any trouble. It could be that we'll have trouble in the real hot weather, but haven't had it yet this year. It's sensitive to heat, there's no question about that.

LAWTON; I did have to do some electrical work because I rearranged the room a little bit, (the way they were facing), and so my recepticles weren't in the right places. That was our site preparation.

The company itself puts a tape on the floor between machines to cover the wiring, so you don't need a false floor.

Next week, in Part III, the users discuss conversion problems resulting from keypunch replacement.

To Supreme Court?

Software Patent Faces Jeopardy

By a CW Staff Writer

WASHINGTON, D.C. – The Solicitor General wants the Supreme Court to overturn the most recent software patent, and has filed a petition on behalf of the U.S. Patent Office requesting the court to hear its case.

Lawrence Wallace, second assistant solicitor general, said it is possible the case may be heard next spring, if the Supreme Court decides to take it.

The patent being contested covers the Benson-Tabbot program to convert data from binary-coded-decimal to true binary.

Lawrence said it was "wrong" to grant a patent for such a "mathematical" method, and called the patent a "departure from established practice."

This particular software patent, like some of the other five, was granted after the Court of Customs and Patent Appeals agreed with the applicants, and overturned the Patent Office disapproval. The Supreme Court is now being asked to uphold the Patent Office.

The Supreme Court could write a decision so broad as to invalidate all software patents, Wallace said, although the court "tends not to write with great breadth."

The case "needn't be decided on the constitutional issue," he added, but could hinge on whether the patent violates the law against patenting mental processes or mathematical steps.

In the end, the case has "great implication" for the computer industry, Wallace added, since it could determine whether future programs will be "tied up in patent monopoly."

Gary R. Benson and Arthur C. Tabbot, and their employer Bell Labs, will have 30 days to reply to the petition, after which the court will decide whether to hear the case. Mid-November would be the "soonest" the court might give this indication, he noted.

Nevada No Copycat

RENO, Nev. – A professor at the Desert Research Institute at the University of Nevada is hoping a simulation model will demonstrate how the effects of population growth, which may be adversely altering California, can be avoided in Nevada.

Dr. Edwin Berry said the model, which will be designed to indicate improved methods of using the state's natural resources, ultimately could clarify the effects of legal, tax and other policy changes on resources, especially land.

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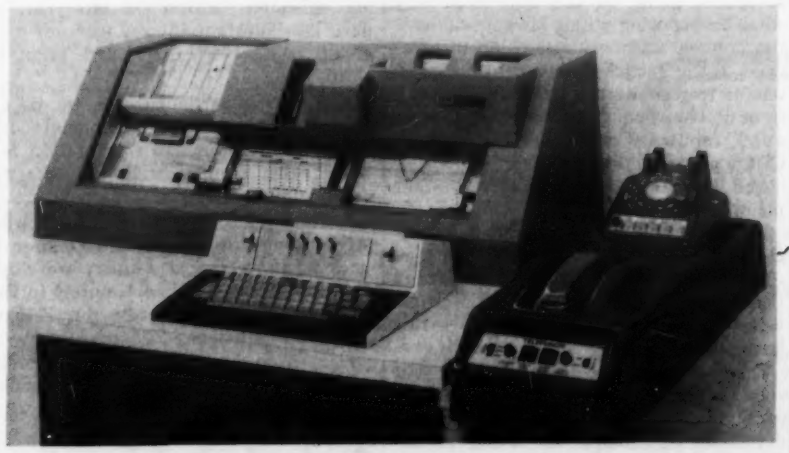

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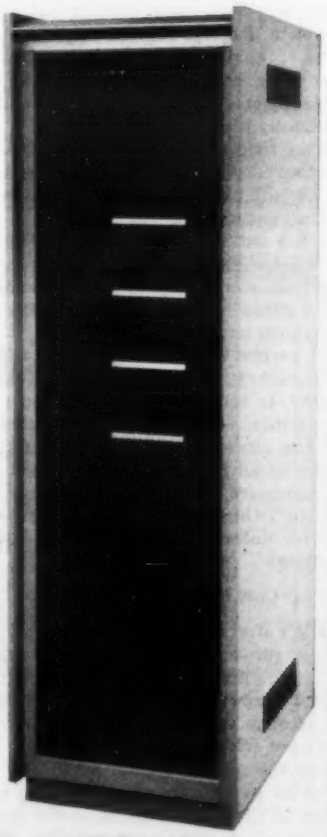

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Editorial

'The Price Was Simply Too High'

Ever since RCA announced it was dropping out of the mainframe business, there has been a great wailing and beating of chests that it's all IBM's fault and that IBM is driving everyone out of the business.

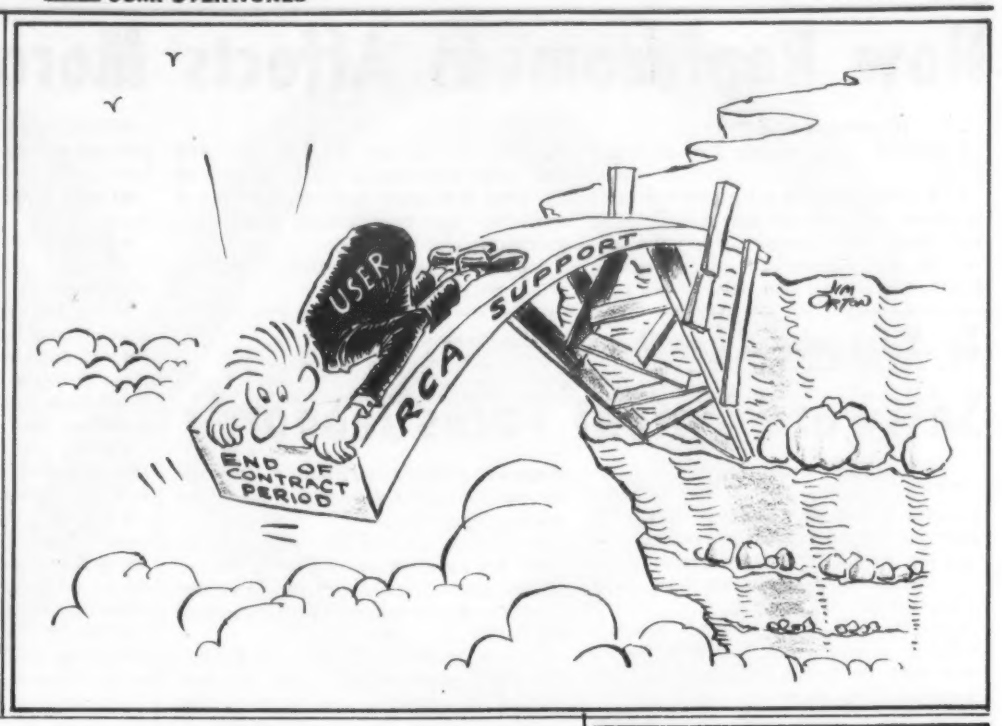
Perhaps IBM can be blamed for a lot of other things, but not for this disaster.

RCA Board Chairman Robert W. Sarnoff started the weeping by referring to "the severe pressures generated by a uniquely entrenched competition."

But Univac President G.G. Probst was quick to state: "Univac has, is now, and will continue to thrive on this competition." And Univac isn't the only mainframe company competing profitably with IBM.

What killed RCA's Computer Systems Division was a fatal combination of wrong maneuvers and inadequate corporate support.

The epitaph for the division won't read, "Murdered by IBM." It will be Sarnoff's statement, "The Price Was Simply Too High."



Users Can Play Role

IBM Must Be Split, and Here's a Way

By Joan M. Van Horn
Special to Computerworld

The demise of RCA as a computer vendor was a shock, and brought to mind once again the problems this industry faces because of IBM's overwhelming dominance.

One of the things which surprises me is that so few so-called professionals in the computer field have spoken out on the problem. Perhaps they have not taken the time to analyze it. Or, more ominously, can it be that everyone *inside* the field already feels their livelihood, directly or indirectly, is dependent upon IBM?

If so, then reform will surely come from the outside, and could well be disastrous, if we abdicate our responsibility to the industry to address this problem.

It is a sad commentary on the degree of IBM's dominance of the computer industry that a company as large and able as RCA could not compete with IBM's overwhelming entrenched position.

As to the oft-quoted figure of 70% of the market, I suspect it is quite a bit higher. In terms of *profit*, IBM must have more than 100%, if you divide its profit by the *algebraic sum* of the profits and losses of all the other vendors of computer hardware, software and services.

I don't think any firm can compete and survive unless something radical is done, and *soon*.

Cost Is Passed to Consumer

IBM's overwhelming dominance of this important segment of our economy has not attracted the attention of professional corporate critics like Ralph Nader or Morton Mintz, perhaps because IBM does not sell directly to the public.

But the cost of operation of any firm must be passed on to the consumer in the price of the end products, so the monopolization of the economically critical computer industry by one company is unhealthy. Its existence and costs to the consumer are just more insulated from the public scrutiny.

The bowing out of RCA will weaken the others, as customers, fearing to be left in the lurch, will choose only companies with known, consistent, published profits from computer operations.

The extent of IBM's influence in the business community is not yet comprehended by most outside observers. Computers are now essential for financial accounting for most firms of any size, and since IBM computers are used for most corporate financial-data processing, IBM has a lockhold on the jugular vein of almost every sizeable corporation.

In addition, IBM's financial strength makes it possible for IBM to fund some of its customers' usage of its equipment during hard times, thus further entrenching itself.

Smaller companies often have their first data processing manager interviewed, suggested, or placed by their friendly IBM salesman, resulting many times in a situation where the DP manager is more loyal to the IBM rep, and job mobility, than to his current employer.

How to Split IBM

The solution, in my opinion, must be to split IBM into many, small, independent, corporations. Not subsidiaries, but separate, divested entities. And the split should be into many companies, not just a few; probably by product, or even by plant, the basic economic unit of production, each with its own marketing force. A split into firms of this size could permit realistic competition with other vendors of mainframes and peripherals.

Viewpoint

I believe, however, that each such spun-off company should be enjoined from selling complete systems or facilities management services, and confined to selling computer components, for at least 20 years.

This, in my opinion, is the only way we can have a healthy, innovative data processing industry. Wresting from IBM its all-pervasive dominance, and *soon*, could be critical to the health of the whole economy, not just the computer industry.

If some such solution is not enforced by the Justice Department, as part of its present action against IBM, we may drift towards an alternative which I find most unattractive, namely the effective nationalization of IBM as an industry unto itself through piecemeal regulation, permanently enthroning its monopoly status.

As a believer in capitalism and the principle of the free marketplace, this is abhorrent to me. There is no need for it in the computer industry if we can take firm, vigorous action now to break IBM up!

Why Haven't Users Acted?

The wonder is that corporate computer users have not tried to have something done about IBM's monopoly position. There seem to be several reasons. Much of top management is still not sufficiently knowledgeable in data processing. They may sense that something is wrong, but are not sure what, and are victims of the IBM mystique.

Again, most large corporations are reluctant to get involved with antitrust matters unless they are forced to; and choose to avoid the Justice Department unless called in.

Small companies cannot afford antitrust litigation; it is very expensive, and the antitrust legal fraternity does not work on speculation. (In fact, it is primarily a defense bar, with almost no plaintiff firms)!

Class Action

However, it certainly lends itself to a class action suit on behalf of all IBM computer users. We can only hope that some enterprising young lawyer will have the courage and resources to do it, especially if the Justice Department proves as unable to respond this time as it has been since it launched its suit against IBM in 1969, reputedly embarrassed into it by CDC's private action.

And there is no relief yet, as another major vendor bites the dust.

The computer field has so much unrealized potential that to allow it to continue to be stifled by the dominance of one firm is irresponsible. I hope this article will provoke vigorous discussion of this issue at last.

There is serious danger that IBM will soon negotiate another consent decree (generally considered a "bargain" for the defendant in exchange for saving the understaffed and underbudgeted Antitrust Division from having to litigate) without any meaningful public debate on the subject by computer professionals.

When Sen. Fred Harris, Ralph Nader, Morton Mintz and others are crying out about excessive power among large corporations, where are our committees on social responsibility?

Let's end the conspiracy of silence. The computer industry will soon replace the auto industry as the kingpin of our economy; let's make sure we don't go from an economy dominated by four giants to an ecomony dominated by only one!

IBM must be broken up to revive competition within this industry, and into many parts, each completely divested from the other (like the Standard Oil split of many years ago). Let us become informed now concerning the issues – political, social, economic, legal as well as technical – and make meaningful contributions to the discussions going on between IBM and the Justice Department.

Letters to the Editor

Many Factors Led to REI Cut in Corp. S Holdings

The article concerning Recognition Equipment's intention to reduce its ownership of Corporation S to less than 20% [CW, Sept. 22] creates an incorrect impression that we are doing this solely because of disappointment in Corporation S financial performance.

Several factors went into our decision to take this action, none of which relate directly to our opinion of the future success and profitability of Corporation S.

This is part of a program begun last year to reduce our interest in all subsidiaries and affiliates. Within the last year, we have also substantially reduced our ownership in Docutel Corp. and Datacraft Corp.

Also, in this particular case, we did not feel that Recognition Equipment could contribute as much to Corporation S as some other companies in the data processing field might.

A third factor is the fact that when Accounting Principles Board Opinion 18 goes into effect next January we would have to account for our interest in Corporation S on an equity basis if we retained as much as a 20% position.

Merle J. Volding
Executive Vice President
Recognition Equipment Inc.
Dallas, Texas

Reader Seeks Information On DP Training of Deaf

I have become interested in the possibility of educating deaf students to be computer programmers. I would like to hear from any of your readers who have had any experience in training or working with the deaf in data processing.

Robert R. Ackley Jr.
526 Deptford Drive
Dayton, Ohio 45429

Sources of DP Art Sought

We have been looking for some time for a source of reproductions of computer-generated art. If your readers know of any source of this material, we would appreciate the information they might supply.

P.H. Koolish
Vice-President
Hartley Data Service, Inc.
4849 Golf Road
Skokie, Ill. 60076

If $40 an Hour Is Reasonable, Why Do I Pay $65?

"If $40 an hour is a reasonabl charge, then why am I paying $65?" This was how one of my correspondents questioned a recent article in which I had been using the $40 an hour figure to demonstrate how the costs of a 360/30 could be misunderstood. [CW, Aug. 25].

The Taylor Report
By
Alan Taylor, CDP

The figure was obtained by checking the going rates for the 360/30 time, and, if looked at in comparison with the IBM rental prices, was low. Standard IBM rentals on the 360/30 are around $12,000 per month, so that at $40 the system would have had to work 300 hours each month to return its rental.

But yet, 360/30 time can be obtained at $40 per hour. How is this a possible price?

Of course, the reason it is possible is because the idea of pricing computer time as though it were the primary product is an evasion of real pricing. A computer installation has two primary functions.

It has to carry out certain work, the main line work for which it was engaged. And it has the duty of reducing the cost, as much as possible, of doing main line work, by doing subsidiary internal work, which avoids corporate money being spent in other directions, by selling out time.

It follows then that as there are two functions, there are also two basic pricings involved in any computer installation. The first is the price to perform the primary work involved. The second is the market price of doing the subsidiary work which should help reduce the primary costs.

If my correspondent was paying $65 an hour for handling work that could be handled on another installation at $40 an hour, and if the work was in fact subsidiary work – then he was paying his $65 an hour because he was paying more than the market price.

Perhaps he was doing this because he did not know the market price. Perhaps he was demanding fast turnaround in prime time.

If, on the other hand, he was simply buying the services of the computer, then the one he was using was over-priced (and probably under-utilized).

At the moment over-priced Model 30 computers are common. All Model 30 systems being rented from IBM are still priced at basically 1964 rates. These are now over-priced in comparison with the current market.

A user can knock his hourly costs down by 30% to 40% – say from $65 an hour to $40 an hour – simply by going out and obtaining a system on the open market.

A failure to do this may be why the charge is $65 an hour – simply not following the market price drop. It is simply a way of becoming over-priced.

But there is another way of looking at the charge. There is the question of just what is this charge for? Few people outside service bureaus want computer time as such. Real users want computer results, not computer time.

Computer output has a value to the user. Users, when they decide to go into computers, accept the fact that they are paying for that output. Normally when one buys things, such as suitcases, or airplane rides, or houses, one pays a price for the item.

You only pay a price on a time basis if you are building the house, or producing the suitcases, or selling those aircraft seats.

You only pay the price on a time basis if in fact you are in the trade of selling the service! The same holds true of computers. If you are in the trade of buying computer time, then you are taking the risks involved.

If further you are buying from an entrenched seller (such as the firm's computer installation), then you may have to pay the time rates which the installation sets – without any regard to whether they are reasonable.

If on the other hand you are a real customer, who is buying a product, then you should be getting a bill that does not read "2.654 hours at $65 an hour" but reads, "For 6,928 transactions at 3 cents per transaction = $207.84."

If he buys that way, the user can find out easily whether different ways of doing work even within the installation will give him different prices.

He can decide then just what he wants to pay for. But as long as he just buys computer time he does not have that amount of control.

So, we can see that there are many possible reasons why my correspondent is paying $65 an hour. It may be that he is simply buying at over the market price, but it is quite possible that he has effectively put himself into the trade of selling computer time as a business, and is doing it with an under-utilized, under-controlled computer.

In any event he, and many other people, would be well advised to question most strongly whether the idea of buying computer time by the hour from their data processing department is a good idea, looked at from a responsibility point of view.

Or is it an idea which leads to wasted resources and improvident computing?

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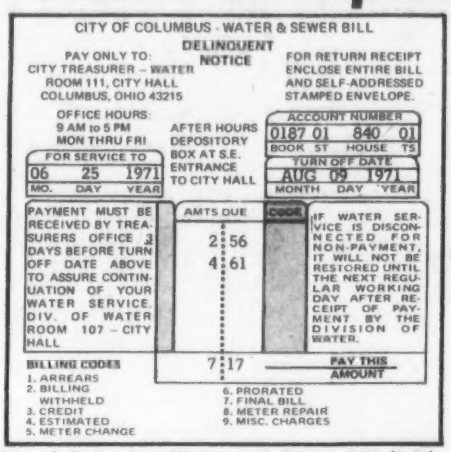
Bill Is Delinquent Before It's Due!



CITY OF COLUMBUS - WATER & SEWER BILL

DELINQUENT NOTICE

PAY ONLY TO: CITY TREASURER – WATER ROOM 111, CITY HALL COLUMBUS, OHIO 43215

FOR RETURN RECEIPT ENCLOSE ENTIRE BILL AND SELF-ADDRESSED STAMPED ENVELOPE.

OFFICE HOURS: 9 AM to 5 PM MON THRU FRI

AFTER HOURS DEPOSITORY BOX AT S.E. ENTRANCE TO CITY HALL

ACCOUNT NUMBER: 0187 01 840 01 (BOOK ST HOUSE TS)

FOR SERVICE TO: 06 25 1971 (MO. DAY YEAR)

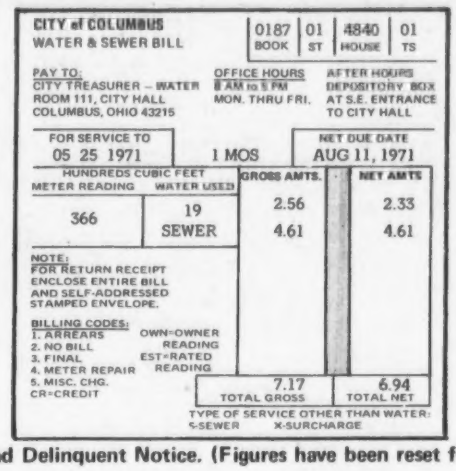
TURN OFF DATE: AUG 09 1971 (MONTH DAY YEAR)

PAYMENT MUST BE RECEIVED BY TREASURERS OFFICE 3 DAYS BEFORE TURN OFF DATE ABOVE TO ASSURE CONTINUATION OF YOUR WATER SERVICE. DIV. OF WATER ROOM 107 – CITY HALL

AMTS DUE	CODE
2 56	
4 61	
7 17	PAY THIS AMOUNT

IF WATER SERVICE IS DISCONNECTED FOR NON-PAYMENT, IT WILL NOT BE RESTORED UNTIL THE NEXT REGULAR WORKING DAY AFTER RECEIPT OF PAYMENT BY THE DIVISION OF WATER.

BILLING CODES
1. ARREARS
2. BILLING WITHHELD
3. CREDIT
4. ESTIMATED
5. METER CHANGE
6. PRORATED
7. FINAL BILL
8. METER REPAIR
9. MISC. CHARGES



CITY of COLUMBUS
WATER & SEWER BILL

0187 | 01 | 4840 | 01
BOOK | ST | HOUSE | TS

PAY TO: CITY TREASURER – WATER ROOM 111, CITY HALL COLUMBUS, OHIO 43215

OFFICE HOURS 8 AM to 5 PM MON. THRU FRI.

AFTER HOURS DEPOSITORY BOX AT S.E. ENTRANCE TO CITY HALL

FOR SERVICE TO 05 25 1971 | 1 MOS | NET DUE DATE AUG 11, 1971

HUNDREDS CUBIC FEET METER READING	WATER USED	GROSS AMTS.	NET AMTS
366	19	2.56	2.33
	SEWER	4.61	4.61
		7.17 TOTAL GROSS	6.94 TOTAL NET

NOTE: FOR RETURN RECEIPT ENCLOSE ENTIRE BILL AND SELF-ADDRESSED STAMPED ENVELOPE.

BILLING CODES: 1. ARREARS 2. NO BILL 3. FINAL 4. METER REPAIR 5. MISC. CHG. CR=CREDIT
OWN=OWNER READING
EST=RATED READING

TYPE OF SERVICE OTHER THAN WATER: S-SEWER X-SURCHARGE

City of Columbus Water and Sewer Bill (left) and Delinquent Notice. (Figures have been reset for purposes of clarity.)

Yet another gimmick on computerized billing comes from the City of Columbus, Ohio, whose water department – after taking five weeks to send out a water bill – followed up with a delinquent notice threatening to turn the taps off *before* the bill itself called for payment to be made!

The original bill – which has no billing date – arrived on Aug. 2, and called for $6.94 if paid by the due date, or $7.17 if paid after. Payment was due Aug. 11. It was followed two days later by a delinquent notice calling for payment of the gross amount, $7.17, by three days before cut-off date (given as Aug. 9) to ensure continuation of the water supply.

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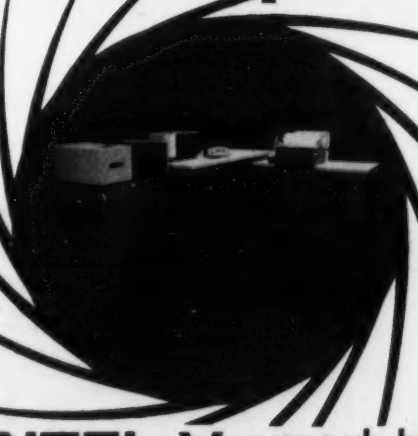

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The Professional's Viewpoint

All Legal Responsibility for Applications Part of User Duties, CDP Holder Says

Early returns on the Professional Rights and Duties Opinion Questionnaire [CW, Sept. 29] included one letter and a number of brief comments.

The questionnaire asked whether a DP manager has the right to review correspondence from other departments which blamed the computer for some action. It also asked whether a DP manager has a duty to know if any of his applications are breaking the law, ignoring government regulations, or providing inaccurate information. And it asked what action he should take in each of these cases.

Comments accompanying the returned questionnaire included the following:

– – –

The questionnaire refers to "his applications" as if they are ADP systems and not systems designed by and for someone else. When we design and program an application or system for anyone outside the ADP center the organization for which we design the application is totally involved in the work. Not just the key supervisors but everyone involved in the operation from the division chief down to any clerks that handle the various source documents. Any application that is automated is always in the complete control of the using organization. Therefore I feel it is part of the using organization's responsibilities to be aware of infringements. The DP manager should be kept abreast of these items by the users. If he learns of any of these irregularities from other sources, he should take whatever action he can to correct them by working with both the user and management.

But, there are problems with this approach.

From a computer standpoint, the first applications or systems are not efficient, but the user is able to use the output and prepare the input.

Sometimes after the first few outputs, the system has to be redesigned because the user really was not sure of what he needed. But again when we are through (by "we" I mean "user" and "ADP") the user can use the output.

This procedure eliminates what I think are the main causes for unreadable output, unusable output and unnecessary input requirements, a system design done by computer "professionals" centered on the computer requirements first and the user's requirements second, and non-involvement of user personnel except a selected few "key" people.

If the DP manager has to keep up with the legal requirements, and the like, of applications run on his computer he would have to be a CPA, lawyer, engineer, personnel management specialist, realtor and last but not least, an administrator. I do not think there is an ADP man with all of these degrees.

In the special cases of single application area organizations such as banks or a credit bureau, this is possible, but in most companies, government agencies or service bureaus, a more varied array of applications is involved. In the case of the service bureau, they should require an affidavit from the user as to the legality of the application to protect themselves. It would be too easy to demonstrate a legal application to a service bureau head and then change one statement for actual runs which would make it illegal. – John N. Lambrecht, CDP, Antioch, Tenn.

– – –

DP managers are American citizens, and have a duty to report all crimes to the authorities. – Michael Gershman, Corona, N.Y.

– – –

The degree of seriousness of any given instance may well warrant resignation or notification of an appropriate outside agency. – R. Kress, Englewood, N.J.

– – –

In many cases, my own included, the DP manager is virtually a company officer. As such, I am legally liable for law breaking. – Roy Nash, CDP, Jenison, Mich.

– – –

There is a clear danger of assigning responsibility to the DP manager which would require a more thorough knowledge of law and government regulations than most DP managers have or in most cases can find time to learn! – C.A. Culver, CDP, Long Beach, Calif.

– – –

All "protests" needless to say, should be in writing and to more than one member of management. – Frank Manola, Philadelphia, Pa.

– – –

In general, if repeated protests are ignored, I feel that the DP manager should seek other employment. – W.R. DeHaan, Lakewood, N.J.

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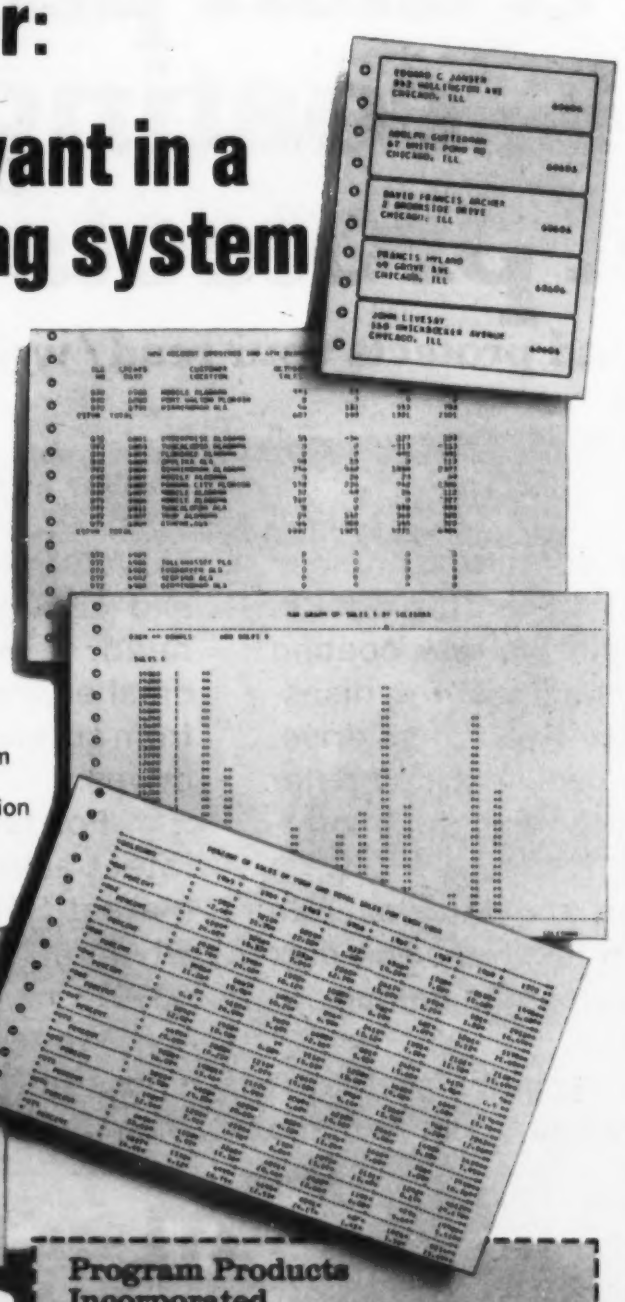

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Radioactivity's Role

Mice Habits Clue to Ecology

ARID LANDS ECOLOGY RESERVE, Wash. – Above the whirring of a computer, a voice shouts out, "Call Alemouse." Within seconds the Alemouse computer program searches memory banks for data on wild mice. Details on where mice are captured, their age, and breeding habits are scanned and printed out.

Then a pen traces out the movements of thousands of the mice living on the 120-square mile Arid Lands Ecology Reserve (ALE). ALE is operated for the U.S. Atomic Energy Commission by Battelle-Northwest.

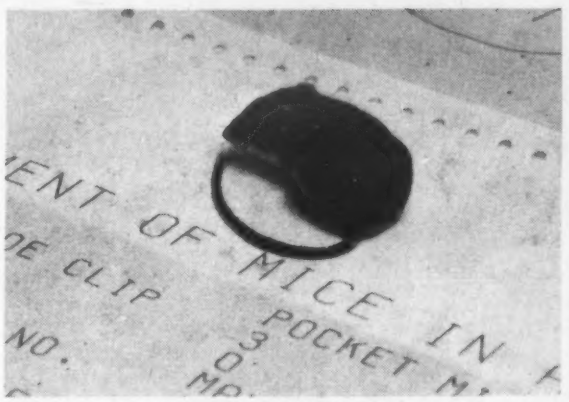
In their efforts to study the effects of radioactive materials on the environment, scientists at ALE have found it important to first study the natural ecological patterns and evolutionary adaptations.

Relationships between living things and their environment are often hidden by nature, because plants and animals react to subtle changes in the environment that humans are not even aware of. The wild mice on ALE are excellent examples of such enigmas.

During winter pocket mice hibernate. The males begin to forage for food in March. The females do not come out until several weeks later.

If food crops are poor, unknown cues tell the pocket mice not to breed after the first litter is born.

Hibernation times, breeding habits, the size of mice territories, and the life span of the pocket mouse are greatly influenced by soil temperature, rain, food, population size, and other environmental cues.



Data on the adaptation of 'Alemice' to their environment is used by scientists seeking to determine ecology patterns as a prelude to studying the effects of radioactive materials on the environment.

Atlanta Schools' DP Prints Braille Texts For Blind Students

ATLANTA, Ga. – More and more blind students in this city's school system are using the same books as their classmates, and volumes in the burned down Braille library are being reproduced through the use of a computer.

The school system's DP department, working with IBM and MIT, has developed a technique by which course materials are entered into a computer which translates text into Braille, and prints out pages at the rate of 200 raised characters per second.

The pages of Braille are bound into books. Additional copies can be printed as needed in a matter of minutes from the master text data which is permanently stored on magnetic tape. Data for the 360/50 may be entered by terminals or by devices that "read" documents printed in special characters.

Insertable Cartridge

The school system uses a cartridge, specially devised by IBM, which modifies a standard computer printer for Braille. It can be quickly inserted or removed, enabling the Atlanta computer to perform many other tasks.

In Atlanta, blind children are placed in regular classes with sighted students and are provided – whenever possible – with Braille versions of standard text materials. A "vision teacher" visits schools on a rotating basis to work with each blind student and his regular teacher.

"Even before the 1969 Braille library fire, there frequently were no Braille versions of texts available either from the library or from publishers," said Dr. Marion P. Boyles, director of the Computer Braille Project.

"Blind students often had to use different books than their classmates. But hopefully, our new system will put an end to this problem, turning out exactly the materials required, whenever they're needed."

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IEEE Computer Conference Wrapup

DP Engineers Seek 'Portable' Pensions

By Edward J. Bride
Of the CW Staff

BOSTON, Mass. – In days of dwindling employment and uncertain job benefits, another computer society is moving toward the economic betterment of its members: "portable" pensions whose benefits follow job-changing engineers is the goal.

Some professional organizations provide free admission to conferences for unemployed members; others waive dues and provide job banks.

But the Computer Society of the Institute of Electrical and Electronics Engineers (IEEE) has broadened its previous strictly technical orientation, in pursuit of this job enhancement.

Portable pensions have been discussed before in IEEE, at least in its Computer Society, but it was only during the recent annual computer conference here that a formal working committee was established to set standards for the idea, and then find an employer willing to implement it.

Forming the committee was the last action taken during an informal open meeting, attended by about 40 members and interested persons.

The proposal to study portable pensions grew from a suggestion that unfair employment practices should be highlighted, as a form of "economic pressure" against some companies.

Another member countered that this was a "negative approach," and suggested that the "good guys" should be found and given a pat on the back.

Eventually a concensus was reached: the "good guys" would be amenable to some sort of portable pension program, provided the groundwork had been laid and studied.

Volunteer Committee

Society President E.J. McCluskey found a half-dozen volunteers to work on the committee when he challenged the audience to study the idea. Additional proposals for portable vacations and similar work enhancements were tabled, pending the success of this project.

The evening meeting was markedly different from the technical emphasis of the daytime sessions, most of which pertained to processor technology, communications, and advanced memory ideas.

One apparent reason for this difference was suggested by McCluskey at the beginning of the meeting when he remarked that the same ideas had always been discussed several times a year.

The other attendees immediately took this as a suggestion for more interesting topics, and the socio/economic ideas came forth.

During a daytime briefing, conference vice-chairman Reinald Neilsen admitted the possibility that redundance occurred in the technical sessions, too.

While some speakers were talking of firmware and microprogramming, others were even more technical, and told of cellular logic and fast Fourier transform (symbolic, rather than arithmetic manipulation, as explained by Neilsen).

More Computing Power

This all indicates the society's continued emphasis on obtaining more computing power for a given dollar investment, Neilsen added. The theme of the three-day meeting was "Hardware, Software, and Firmware Tradeoffs," with software receiving the least emphasis.

In assessing the technical presentations as they related to the conference theme and the society, Neilsen observed that performance measurement is still one of the most difficult problems for users and designers to solve.

One reason is that the solutions themselves are sometimes "difficult to characterize," making measurement even more evasive, he noted.

Astronaut Edgar Mitchell gave an example of this problem during his keynote address and a press briefing. He said the 90 and 120 seconds required for certain computations in the Apollo project had been "unsatisfactory," and the elimination of a "couple hundred decimal places" reduced the time needed to about five seconds.

The decimal places had to do with "hover distance" over the lunar surface, Neilsen later explained, but the principle of eliminating "unnecessary accuracy" could also be applied to everyday situations, he said.

Tape Librarians Slate 'Exploratory' Meeting

NEW YORK – The problems of tape librarians in corporate computer centers will be aired late this month at an "exploratory" meeting which could launch a tape librarians association.

Tape librarians interested in participating, or in receiving progress reports, should contact The Parker Organization, 366 Madison Ave., 10017.

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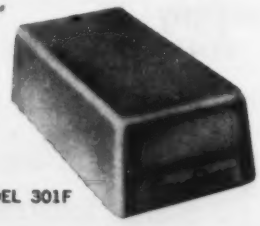

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COMPUTERWORLD

societies/user groups

Users of T/S Service Form Group, Non-Hardware Orientation Viewed

By a CW Staff Writer

NEW YORK – The technical aspects of time-sharing may take a back seat to the betterment of service, as a new users group with a different orientation becomes more effective.

The new group is CSS-Share, and is comprised of time-sharing customers of National CSS Inc., of Stamford, Conn.

Normally, user groups are associated with a hardware or software product of a particular manufacturer, and not with a service; CSS-Share may be the first of its kind to get off the ground.

The group held its first meeting here recently, and guest speaker Eugene Gaines, president of Time-Sharing Enterprises, told the users he expects the group to "branch out into some new, interesting areas."

It will be interesting to see eventually how much emphasis the organization puts on the service itself, rather than on the technical aspects of computer systems, he said.

The members share National's twin IBM 360/67s in Stamford and a single 67 in Sunnyvale, Calif. About 80 members attended the inaugural meeting; the company has about 1,600 users.

Robert Schraer, assistant to the vice-president, marketing at National, said the group was spawned by the number of inquiries the company received from its clients. A survey of the customers showed there was enough interest to form the fledgling group, Schraer added.

The acting president of the user group is Albert Kolkin of RCA Records.

Newell Named '71 Goode Recipient

LAS VEGAS – A pioneer in artificial intelligence and programming language development will receive the eighth annual Harry Goode Memorial Award, during the closing-day luncheon of the Fall Joint Computer Conference, Nov. 16-18 here.

Dr. Allen Newell, university professor at Carnegie-Mellon, will also be cited for contributions to the computing profession's understanding of the human thought process.

Among Newell's early works were the first programs to prove theorems, and the development of list processing languages. Later, working with H.A. Simon, Newell developed the General Problem Solver program, which provided the first detailed simulations of human problem-solving behavior.

The award is presented during each FJCC by the sponsors, the American Federation of Information Processing Societies (Afips) and is named in memory of a former chairman of the National Joint Computer Committee.

Datagraphix COM Users to Convene

LOS ANGELES – Business, scientific, and computer animation users of COM equipment will observe the tenth anniversary of Uaide, Users of Automatic Information Display Equipment, when the group holds its meeting here Oct. 25-29.

Special presentations on new Datagraphix COM hardware developments and software programs will be featured, according to Uaide officials. Membership is limited to organizations that own or lease Datagraphix equipment, or use it in a service bureau or on a contract basis.

Calendar

Oct. 21-22, Denver, Colo. – Adapso's 33rd Management Conference and Annual Meeting concurrent with the First Software Management Conference. Contact: Association of Data Processing Service Organizations, Inc., 551 Fifth Ave., New York, N.Y. 10017.

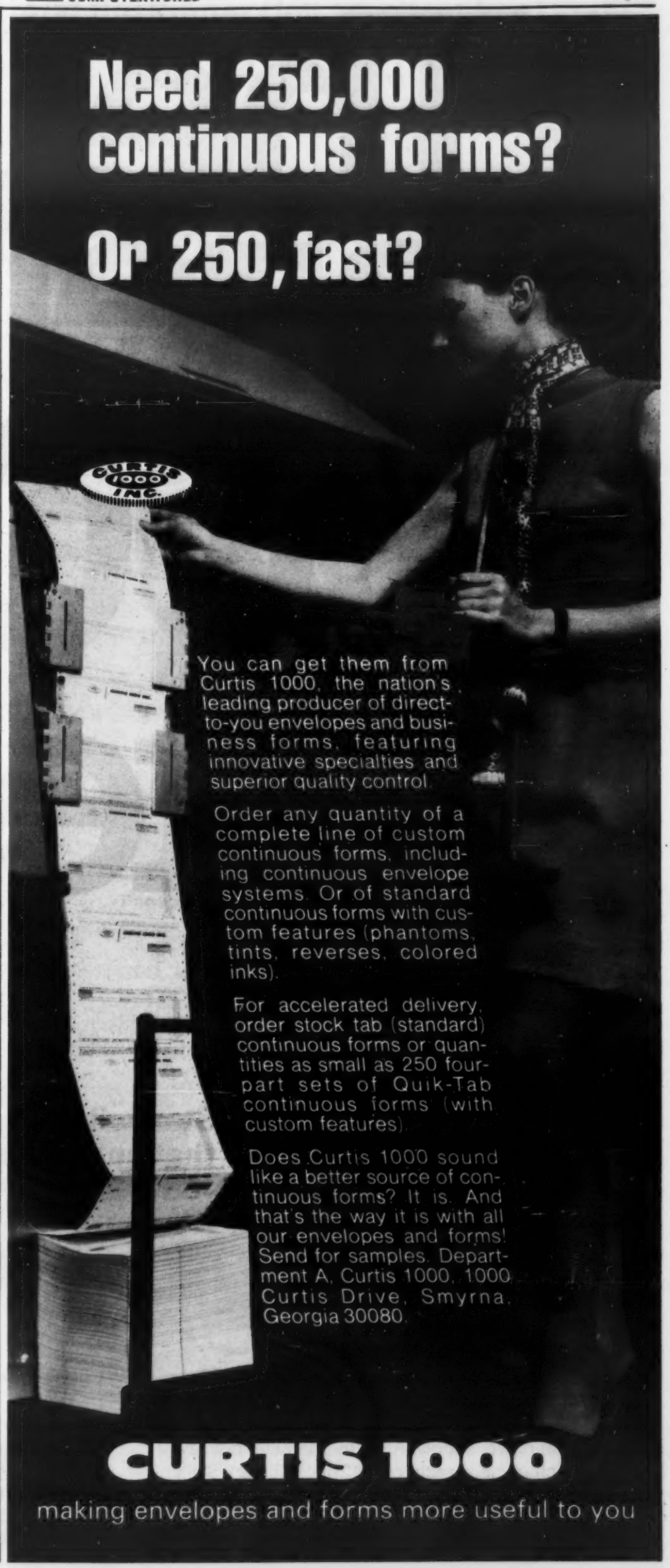
Oct. 22, Bakersfield, Calif. – DPMA Division 1 Conference "EDP Trends of the 70s." Contact: Stephen M. Tapley, Libra Computer Systems, Inc., 1820 Brundage Lane, Suite C, Bakersfield, Calif. 93304.

Oct. 23-26, Washington, D.C. – The 35th Annual Meeting for Information Science (Asis). Contact: Robert McAfee Jr., Asis Headquarters, 1140 Connecticut Ave., N.W., Suite 804, Washington, D.C. 20036.

Oct. 25-29, New York – Bema 1971 Business Equipment Exposition. Contact: Prestige Expositions Inc., 60 E. 42nd St., New York, N.Y. 10007.

Oct. 25-29, Anaheim, Calif. – 1971 Joint National Conference on Major Systems sponsored by the Operations Research Society of America and the Systems, Man and Cybernetics Group of the IEEE. Contact: Dr. Robert W. Elsner, A-833-BBEO-M.S. 8, McDonnell Douglas Astronautics Co., 3000 Ocean Park Blvd., Santa Monica, Calif. 90406.

Oct. 26, Washington, D.C. – Second Annual Symposium of the ACM Special Interest Group on Computer Systems Installation Management (SigCosim). Contact: I. Feldman, Wiley Systems, Inc., 6400 Goldsboro Rd., Bethesda, Md. 20045.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2. Add the Printer Unit for silent hard copy. $78 per month
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Provides users of the Hazeltine 2000 with a choice of modes —Conversational or Page (regardless of whether or not the terminal is on-line to a computer or communications system). Operating mode may be switch-selectable by the operator, or selected by the CPU under program control.

Conversational Mode—All data exchanged between terminal and computer is printed, the Printer Unit automatically assuming the baud rate of the terminal-computer system, at 10; 15; or 30 characters per second.

Page Mode—Prints only on command from the operator or CPU when meaningful data is on the screen. Using the powerful buffering capabilities of the Hazeltine 2000, printing occurs directly from the terminal's 2000-character core memory, permitting the screen to be filled, edited and then printed at 30 cps, regardless of the baud rate set for the terminal-computer network.

3. Or add the powerful, high-speed "dual" Tape Cassette Unit. $79 per month
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Paper Tape Emulation Mode—Compatible with the Printer Unit's Conversational Mode. Data is recorded character-by-character as it is generated by either keyboard entry or from CPU, at speeds up to 1200 baud with no timing considerations necessary. Recorded data may be played back subsequently at baud rates selected on the terminal, and transmitted to the CPU.

Page Mode—Pages (screensful) of data are recorded by the operator, who may edit before recording. Pages may be retrieved by the operator for review or transmission to the CPU. Additionally, either cassette may be selected, by CPU under program control, for recording or playback through the terminal.

4. Put them all together for complete System capability. $245 per month
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COMPUTERWORLD

education

Non-English Taught Programming With Adaptable 'PL/1' Language

CHICAGO – Schools and colleges wishing to teach non-English students the concepts of programming may be able to do the job with adaptations of IITran, a PL/1 type language from Illinois Institute of Technology.

One version, Spantran, is being used by IIT as the basis of a ten-Saturday course for Spanish-speaking students.

The principal problem faced by schools wishing to adapt IITran to other languages would lie in the translation of the diagnostic messages, an IIT spokesman said.

Another problem faced by adaptors would be the preparation of adequate student manuals in the desired language. IIT can provide the basic English language texts written for IITran.

Either IITran or Spantran will be made available to other educational institutions at minimal if any cost. Arrangements can "probably be worked out" with business firms wishing to use the IITran package for training purposes, IIT said at 3300 So. Federal St., 60616.

At Lexington High...

Students Work For DEC, Others

By Don Leavitt
Of the CW Staff

LEXINGTON, Mass. – Three students from Walter Koetke's programming classes at Lexington High spent the summer writing school administration applications for the PDP-8/i. Originally intended for in-house use by the school, the project was largely funded by DEC and the programs are expected to be made available to other DEC users later this year.

Other Lexington High students have also found summer programming jobs at local software houses and user installations. These may be using almost any CPU: the first project one student was given was to help build a new loader for the IBM 1130.

And the summer jobs, which generally become available to students between their junior and senior high school years, have often been handled well enough so that the students go back to the companies fulltime once they graduate from school.

Lexington uses Basic almost exclusively on its PDP-8/i and offers three courses formally geared to DP subjects. About 120 students are in the basic programming course, and an equal number take computer-related math. About 80 start the Computer Science course, but only about 30 complete it.

The PDP-8/i is also made available to almost any instructor who "wants it" to complement math, science or other academic subjects.

The technically-oriented students who head for engineering colleges after high school generally have not been the ones who take the computer science course, Koetke noted.

The pre-engineering students apparently pick up all the programming concepts they need from the classroom-related exposure and from browsing through technical manuals.

In addition to formal DP courses, support of other academic courses and developing administration applications, the Lexington system, with some 12 terminals, is being used by other schools including one elementary school.

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Seminar on Data Structure Set for Las Vegas at FJCC

NEW YORK – The Association for Computing Machinery (ACM) has added another one-day course, Data Structures in Programming Languages, to its Professional Development seminar schedule.

Designed for DP professionals with at least two years experience, the course will consider current approaches to understanding and use of languages such as Algol and PL/1.

The new seminar will be presented in various cities, starting in Las Vegas on November 15, the day before the FJCC. Further information is available from ACM at 1133 Avenue of the Americas, 10036.

Chicago Work-Study Program Seeks Additional Employers

CHICAGO – A cooperative vocational education program called Data Processing Occupations, the first of its kind in the Chicago area, has been initiated at Bowen High School this September. Under the program, students, all seniors, complete their required courses in the morning and are available for work in the afternoon.

The students in the program are trained as keypunch operators and some have had time-shared experience with Cobol and Fortran programming, according to Charles Shanle, faculty coordinator for the project.

Kenbak-1 Teaches Programming

NORTHRIDGE, Calif. – A portable computer with five addressing modes, a range of instructions and 256 bytes of MOS storage, the Kenbak-1 from Kenbak Corp. can be used to teach programming theory and other fundamentals.

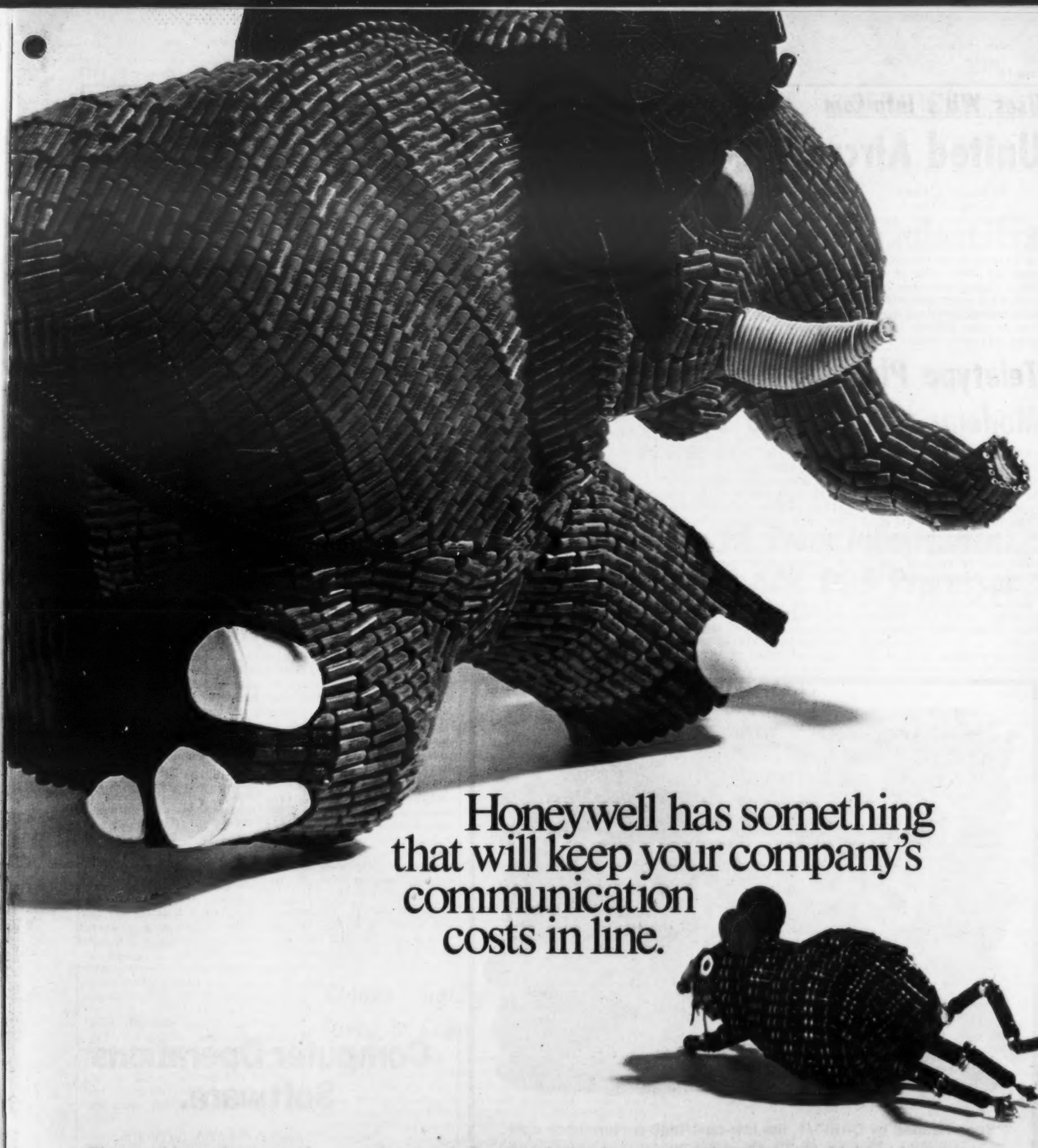
The manuals that come with the $750 machine are written on different levels geared to the user's level of understanding.

Kenbak Corp. is at 8714 Darby Ave., 91324.

ABC Credits Hiis Course Work

ATLANTA – Thirty college credits towards a bachelor's degree will be allowed all graduates of the Honeywell Institute of Information Sciences (Hiis) by Atlanta Baptist College, under an agreement signed recently with Honeywell.

Approximately 40% of the students attending the Hiis here in Atlanta do not have college degrees and could benefit from the new arrangement with ABC, a Honeywell spokesman noted.



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Uses WU's Info-Com

United Aircraft Cuts Costs 20%

By Ronald A. Frank
Of the CW Staff

Although most users equate communications services with the Bell System, United Aircraft has reduced its communications costs by 20% using Western Union's Info-Com service.

Info-Com offers store-and forward message switching capabilities to users through five national computer centers which use Univac 418 and 1103 CPUs.

First introduced in 1968, Info-Com offers users Model 33 Teletypes which can communicate only with other stations leased by the same subscribers, or send messages to Telex and TWX subscribers.

United Aircraft operates 17 terminals to link its five divisions across the country. It uses its Info-Com facilities, for example, to inform customers about product modifications and distribute administrative reports to field representatives. One division sends about 8,000 messages monthly.

From the Connecticut area, message traffic goes to WU's computer center in New York where the CPU stores messages for routing. Information is automatically sent to the proper destinations and when a receiving station is busy, the CPU will hold a message until the TTY is clear to receive.

Previously, the firm used Bell System private lines, and traffic going west had to be routed through intermediate points in the midwest. "Our circuits were continually overloaded," Joseph Hickey, United's communications supervisor said.

Info-Com rates are based on level of usage at each terminal. Since United is classed as a high-volume user, it pays $375/mo for each terminal. Moderage usage costs subscribers $150/mo and low use costs $65/mo. In addition, 10 cents per message is charged by Western Union.

Teletype Plans to Add Modems to 33,35, 38 TTYs

SKOKIE, Ill. – The Teletype Corp. will offer built-in manual originate and answer modems on its Model 33, 35, and 38 Teletypes beginning late next year.

The feature, which will eliminate the need for attached modems from independent suppliers, will be available only as optional equipment on new teletypewriters.

But one source said it would be relatively easy for Teletype Corp. to later offer the built-in modem as a field-installable item. In addition, an automatic originate and answer feature could be added later.

The new modems will be compatible with Bell 101, 103, and 113 data sets, but apparentl they will not be produced by Western Electric, which is Bell's supplier and also Teletype's parent firm. A Teletype spokesman said the modems will be built in-house.

The modems will be available in the third quarter of 1972 and will "add about $200" to TTY purchase prices. This will probably add about $15/mo to rental prices on a Model 33.

COMPUTERWORLD
communications

Processor and Tailored Software Available for Canadian Data Use

OTTAWA, Ontario – The Trans-Canada Telephone System (TCTS) has announced a new offering called Software Controlled Communications Services which will be part of its expanding data capabilities.

Unlike the restraints imposed on common carriers in the U.S., TCTS will offer processors and tailor-made software to data subscribers.

Scheduled to become operational in about nine-months on the existing Canadian analog phone network and later on new all-digital facilities, SCCS will include specially modified Super Nova minis in addition to software designed to meet each user's needs by Bell Canada.

The Super Nova operating as a front end processor will control data circuits, diagnose line problems, and perform all data-related functions which are now handled by the user.

The first SCCS users will begin operations next spring, and eventually the service will operate in conjunction with the new TCTS LD-4 cable, which is scheduled to begin service in 1976. The cable network will give data users a possible bit rate of 281 Mbit/sec for distances up to 4,000 miles, a spokesman said.

Such transmission rates will require the development of new state-of-the-art hardware. Present TCTS facilities can handle up to 50 kbit/sec data rates.

Bell Canada, the largest phone company in TCTS, has committed "30% of its corporate emphasis" toward the development of data facilities, the spokesman said.

Users Program Interdata Model 16

OCEANPORT, N.J. – Interdata has introduced a 16-bit programmable data communications processor designated the Model 16.

Based on the earlier Model 5 minicomputer, the Model 16 adds a read only memory with an expanded instruction set for communications environments.

The Model 16 has a set of 114 instructions including fixed point arithmetic, byte handling, status control, and a "variety" of I/O instructions. Memory has a 1 μsec cycle time with a capacity ranging from 8K- to 65K bytes.

The Model 16 multiplexor can handle up to 256 devices with request/response I/O logic. Multiplexed blocked data transfers are possible without interrupting the running program until an entire message is transferred.

Operating in conjunction with concentrators, multiplexors, and terminals, the Model 16 assembles and disassembles messages, checks message parity, and handles code conversion, error control, code conversion and message format manipulation.

As a stand-alone processor, the Model 16 is designed for jobs having high I/O and minimal processing requirements.

With 8K of directly addressable memory, the Model 16 costs $14,700. Maintenance adds about $250/mo, a spokesman said. Interdata is at 2 Crescent Place, 07757.

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Random Notes

COM Software Standards Studied by New Group

WASHINGTON, D.C. – A standards committee, to be responsible for computer output microfilm (COM) software, has been formed by the National Microfilm Association Standards Board.

The committee's first task will be to collect, organize and prepare for publication, a handbook or collection of the present state-of-the-art input codes and formats acceptable to available COM recorders. The new group will be headed by Richard Donaldson of the Fluor Corp., Los Angeles.

'Autoflow' Available on Monthly Metered or Unlimited Use Plans

PRINCETON, N.J. – Autoflow, the flowcharting package, is now available from Applied Data Research (ADR) on two monthly plans or on a permanent basis.

A monthly "metered" plan involves a monthly minimum of $100 and a surcharge based on number of program statements processed. An unlimited use monthly plan, with a 30-day cancellation clause, is also available.

The former three-year lease agreement has been replaced by the permanent license, for the same cost as the old arrangement. ADR is at Route 206 Center.

'Tide' Handles Text Editing On Hewlett Packard System

CUPERTINO, Calif. – The Hewlett-Packard HP 2000C time-shared system can be used for editing, storing, retrieving and formatting textual information, with the Tide program from HP.

Tide allows users to insert, delete or relocate characters, lines or sentences. Formatting under Tide includes width of line, line justification and number of lines per page. Pagination and page headings are also provided.

The package is available on magnetic tape for $25, including program documentation, from 110 Wolfe Road.

NCR Reissues 'Emphasis'

DAYTON, Ohio – NCR has released an enhanced version of its Evaluation Management using Past History Analysis for Scientific Inventory Simulation (Emphasis) software for food and hard-goods distributors or manufacturers.

Emphasis uses a firm's past experience to set up a mathematical model from which to achieve the most beneficial balance between inventory and customer service. Written in Neat/3 and Fortran, it requires a 32K NCR Century 100 or larger CPU.

Dataroyal 'SAS' Reports Sales

NASHUA, N.H. – Users with any CPU from the IBM 360/20 to the 370/135 or larger can use the Sales Analysis System (SAS) from Dataroyal Inc. SAS provides weekly, month-to-date and year-to-date information on commissions, individual salesman's performance, territories or by product type.

SAS, programmed in RPG, is delivered with customized interfaces to present or planned accounts receivable systems. Available in either disk or tape oriented versions, the package costs $6,500, from 235 Main Dunstable Road, 03060.

Languages Are Key

Tests Show 360/20-360/22 Trade-Offs

By Don Leavitt
Of the CW Staff

ROANOKE, Va. – Users who are considering moving up from a 360/20 to the "stripped down 30," the 360/22, might be wise to take a second, and then a third look before committing themselves to that alternative. Benchmarks conducted here recently show that through-put might well be severely degraded by going to the 22.

The tests, run at Lewis-Gale Hospital, indicated the effectiveness of a switch to the 22 depends heavily on the choice of programming language. RPG programs transferred to the 22 will run an average of 30% to 35% slower than they did on the 20, according to Mickey Schmidt, director of computer services at the hospital.

Assembler programs run 20% to 30% faster on the 22, but only if the dual I/O work areas can be used. If they cannot, the performance on the two machines is approximately the same, Schmidt said.

To get what it considered valid comparisons, the Lewis-Gale center processed exactly the same data files with exactly the same programs, except for those specification differences required to make the Mod 20 programs work on the 22.

Degraded performance could not always be offset by use of the dual I/O because programs generally took more core on the 22 than they had on the 20. RPG programs that ran on a 16K 360/20, required all, and sometimes more than the 24K on the 22. Assembler programs generally required 2K to 4K less core on the 360/20, Schmidt found.

The tests ranged from assembly or compilation runs, through file copying and sorting, and included various business applications. Assemblies took 70% more time but sorting was 6% faster on the new machine. The sort required twice as much disk space on the 22.

An accounts receivable program, coded in RPG, ran 34% slower on the 360/22. As an experiment, the hospital recoded the application in Assembler and that version ran 34% faster on the 22 than the RPG version had run on the 20.

Schmidt noted that the facilities of DOS, which are available on the 22, either offset some of the system downgrade in RPG or enhance the superiority of the model 22 over the model 20 running assembler programs.

He added that the 22 has been in operational status since early August and that, considering all the tradeoffs, the hospital is satisfied that it made the right decision.

Assembler FX From Independent Matches IBM 44K DOS Processor

BOSTON – DP&W Inc., an independent vendor, has developed Assembler FX as a "plug-to-plug" replacement for IBM's DOS Assembler F, which is losing its centralized programming support as of November 1st.

The new package, available immediately, is said to have the same system requirements as IBM's Assembler F. By utilizing 44K bytes of core, DP&W's language processor will operate with the same speed as the soon-to-be-unsupported package.

By dropping its Assembler F to Class C, IBM had put its users in the position of continuing to use its fast, unsupported processor or of shifting to the slower but still backed 14K Assembler D.

While it will provide all the features of Assembler F, Assembler FX also makes available a series of additional features including support of extended floating point instructions and the "L" type DC/DS instruction. Assembler FX also provides support of the external variable (WXTRN) instruction.

DP&W Inc., 1107 Commonwealth Ave., 02215, said that Assembler FX rents for $50/mo.

Capidyne Has OS for Nova Minis

CAMBRIDGE, Mass. – Users of Data General's Nova/Supernova minis can gain operating system functions superior to those on some full-scale CPUs, with the disk-oriented Capidyne OS, available now from Capidyne Corp.

The system includes a resident supervisor, data management facilities, a system monitor, language processors and utility packages. It is designed primarily for business and telecommunications applications and requires a minimum 12K Nova.

The resident supervisor functions in the four general areas of task management, task switching, I/O supervision, and console support.

Data management simplifies the programmer's task of manipulating external files and controls the physical and logical organization of these files. The Capidyne OS can control any of Data General's current peripherals, a spokesman said.

The data manager utilized two classes of access method, character sequential and virtual. The first applies to unit record and magnetic tape devices. There are three virtual access methods for handling disk files and/or source program libraries.

The utilities available under Capidyne OS include a linkage-editor and a sort/merge.

Capidyne OS is available on an indefinite lease arrangement for $8,000. This price includes object tapes, manuals and one year of maintenance. Capidyne Systems Corp. is at 71 Rogers St., 02142.

'Cotune' Highlights Times Spent in Cobol Executions

CUPERTINO, Calif. – Cobol program testing and optimization becomes an orderly and simple operation with the use of Cotune, the Cobol execution time analyzer program from Compu-Trend. The package accumulates the time spent in each area of the programmer's code and reports the totals in table and histogram form.

Cotune is written mostly in Fortran and will operate on any CPU with provision for timing interrupts.

Cotune may be permanently leased for a one-time payment ranging from $3,500 to $5,000 depending on the user's configuration. Manuals, any updates and a year's maintenance are included in the base price. Compu-Trend is at 20440 Town Center Lane, 95014.

'Atlas' Available for DOS

TAMPA, Fla. – GTE Data Services Inc. has developed an improved version of the Automated Tape Library Accounting System (Atlas) for OS/360 users, and has also produced a DOS implementation of the basic Atlas capabilities.

Atlas is used in a serially-oriented magnetic tape environment to record the status, location and history of each tape. In its original form, the program required 88K of memory. The improved OS version and the DOS package now require only 40K, the company said.

Atlas is available on one-time lease prices of $5,000 for the OS package or $4,000 for DOS.

GTE Data Services Inc. is at 5422 Bay Center Drive, 33609.

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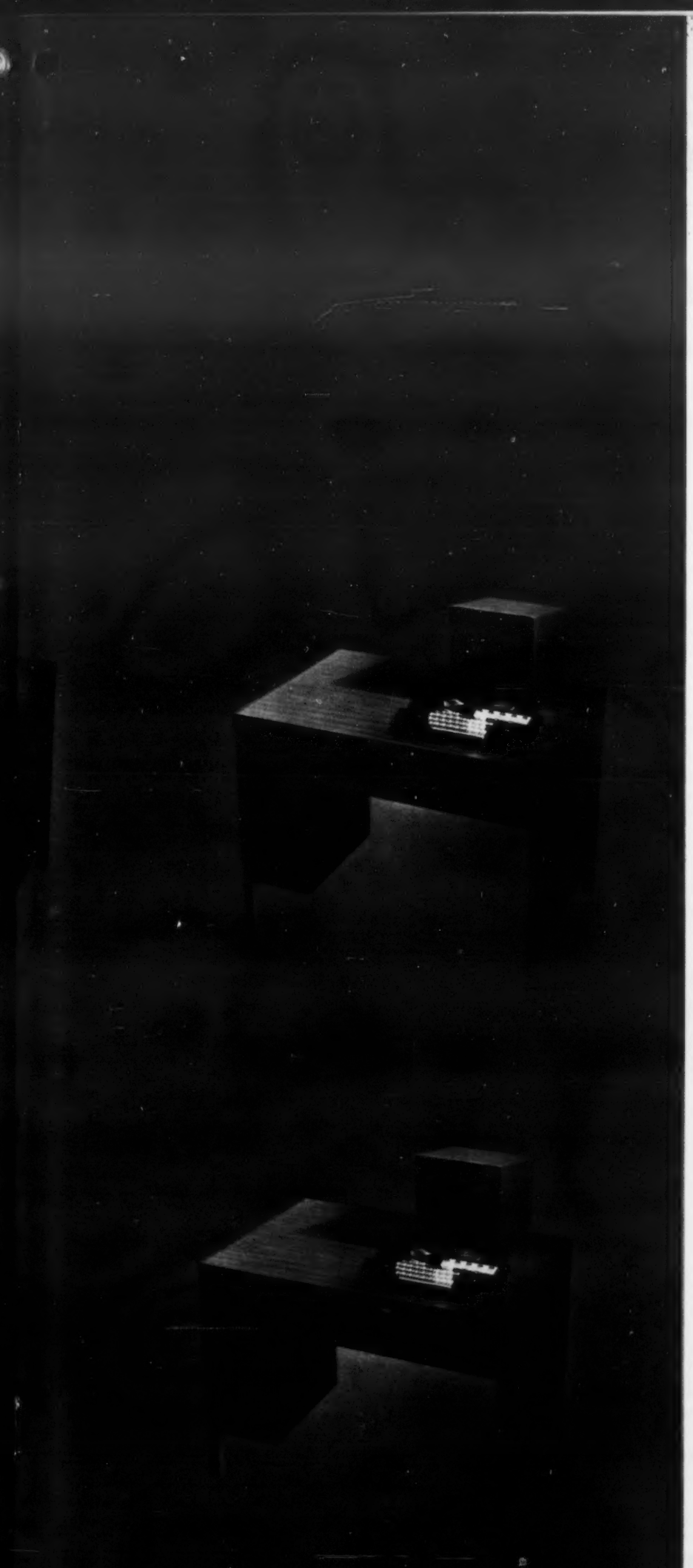

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Copyright Seen Best Program Protection, Covers Unauthorized Use, Translations

By Calvin N. Mooers
Special to Computerworld

A recent restudy of copyright with respect to computer software has disclosed what appears to be the pre-eminent suitability of copyright for the protection of software which must be published in order to bring it to market. Readers are advised to seek competent legal counsel, however, before acting on the viewpoints expressed here.

Rather than attempting to copyright program tapes or cards, as has been the approach in the past, it was concluded that the focus should be on the listing of the computer program, and that this printed text should be used as the published copy for copyright.

By this stroke of putting the copyright on printed text, rather than on tape, the manifold legal problems and doubts about the legitimacy of a copyright on a published program tape disappear.

The mere fact that the copyrighted text happens to be a computer program cannot negate copyright. Such a program text is a kind of writing which is widely read and used by computer professionals in thier work, quite apart from its application after transformation to the control of a computer.

Taking the text of a program as the basis of copyright, the various kinds of exclusive rights stated in the law and derived from copyright can be relied upon. These rights include making translations "into other languages and dialects" and the "making of any other version" of the protected text.

Viewpoint

Such protected derivative works include not only text copies, but also tapes and cards (now viewed as "molds, matrices, or other means . . . for making infringing copies"), various compiled versions of the program and object binary code programs (which are again expressible as text listings), and flow diagrams of the program.

Copying such original or derived versions from one place to another within a computer installation or into other media is protected. Performance of any form of the program is probably also protected.

Translation from a program listing in one language, such as Fortran, into any other computer language, such as Jovial, is protected. The high inherent value in a completely debugged program, residing in the correctness of a multitude of details, is also protected from copying.

Two additional conclusions, which seem very difficult logically to avoid, follow from the deeper transformations that can be made from the copyrighted text. [See Addison-Wesley Publishing Co. v. Brown, 207 F. Supp 678, affirmed 233 F. Supp 219 E.D.N.Y. 1963.]

Derived Texts Covered

If the first published description of a new command system or programming language is copyrighted, and if it is an exact and complete definition of the commands or language, then such a copyright would seem to give exclusive rights to the preparation of any derived text which is an adaptation of the copyrighted text.

Such a derived text might be a program text for the operating system so defined, or a program for the compiler to compile programs written in the new programming language.

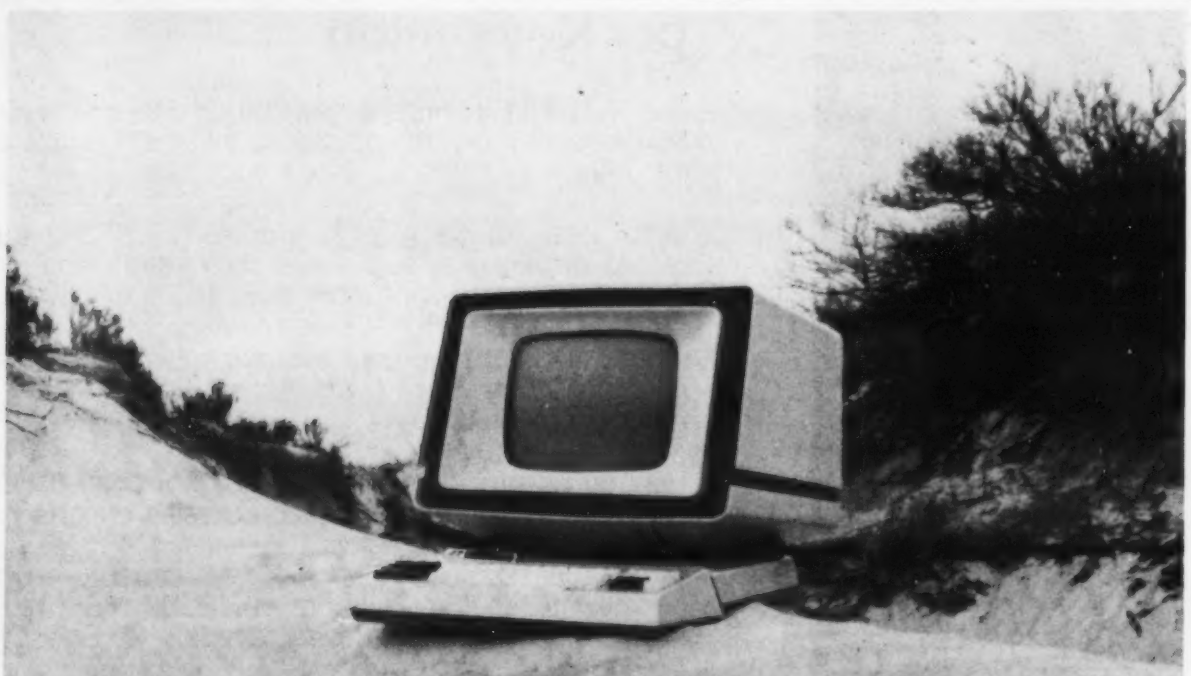
Certainly the author of the defining text for such new developments would desire to retain his exclusive rights for making and marketing such derivative program texts.

The second conclusion applies to new computers. If the text of the first published definition and description of the computer's new instruction set is copyrighted, then this would seem to give exclusive rights to the preparation of all derived texts (or diagrams).

These might be microprograms for the execution of the instructions in the new instruction set. It is noted that such microprograms might be used by a competitor (either in a read-only memory or in built-in wired logic) to enable the competitor's computer to mimic completely the functional behavior of the new computer.

Mimicking the new computer in this way depends upon first making an infringing copy (the microprogram derived from the copyrighted text), and so accordingly the damages and profits accruing from such infringement might be recoverable.

Calvin N. Mooers holds the copyright on the Trac language which he devised for interactive string manipulation. He also holds several patents on coding systems for information retrieval.



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Bits & Pieces

HIS Adds High Capacity Series 200 Disk Systems

WALTHAM, Mass. – Honeywell Information Systems has added two high capacity disks to the Series 200 family. The 276 and 277 give users of smaller CPUs the equivalent of a 2319 capability, and larger users a double density type drive. Both systems use 2316-type packs.

The Type 276 for use on the Model 115 and 115/2 provides on-line storage of 74.8M char. for a subsystem with two drives and a control adapter. Up to four drives can be attached to a 115 and eight drives can be attached to the 115/2. The system transfers data at 208K char./sec.

The Type 277 can be used with 1015 through 8200 CPUs and includes a buffered controller which is said to cut down on the time that channels are committed for data transfer.

The 276 is priced at $1,295/mo for a two drive system with controller on a five year contract or $67,200 purchase.

The 277 with two drives and controller is $1,760/mo under a five year lease with a purchase price of $86,020.

Add-on Memory Attaches to PDP Via Controller Card on Unibus

SHERMAN OAKS, Calif. – Standard Memories Inc. has announced the Ecom F-11 plug compatible add-on core memory unit for DEC PDP-11 users.

The 750 nsec cycle time system attaches via a controller card to the PDP-11 Unibus. It is available in 4K or 8K increments up to 32K. Present PDP-11 users can field-install the system.

The F-11 is priced at $4,500 for a basic 4K system. Standard Memories is at 15130 Ventura Blvd., 91403.

OCR-B Reads 1403 Output

MOORESTOWN, N.J. – Orbital Systems Inc. has added an OCR-B reading capability to its Orbit/1 document reader.

Although used mostly in equipment supplied by European companies, OCR-B readers may also have an application in this country for users of IBM 1403 printers.

The Orbit/1 reader with OCR-B can read unmodified 1403 output, according to an OSI spokesman. The reader costs $730/mo with the new capability. OSI is at Church and Fellowship Roads, 08057.

Five Systems Available

Independents Vary on Double Density

By Michael Merritt
Of the CW Staff

When IBM announced its 3330 disk system, the independent peripherals makers were thrown into a quandry. They couldn't second source the 3330 since they didn't have the specifications, but they still wanted to supply users with a comparable random access storage system.

The answer they came up with is the double density disk drive, a system that is more or less 2314 compatible, but has twice the storage capacity of the 2314.

Using the double density units requires some care. Unlike the 2314 replacements, they are not identical to any IBM disk systems. They aren't, in the words of one well-known board chairman, "Chinese copies."

Five Systems

So far, there are five suppliers of double density disks: Calcomp, Control Data, Marshall, Memorex, and Telex.

There are two main problems in developing double density disks: how to double the storage capacity, and how to adapt the units to OS and DOS.

Four of the five makers – Memorex is the exception – have increased capacity by doubling the number of recording tracks on the disk surface. This makes it possible to have two "phantom spindles." By jiggering the disk drive controller, the operating system "sees" two separate 2314 drives, while actually there is just one double density spindle.

This leads to complications.

Track Arrangement

The first is how the tracks are arranged. Control Data and Marshall have arranged the tracks so that there is an inner and an outer phantom or "logical" spindle. Since the read-write head doesn't have to move as far to reach the logical spindle on the outside of the disk, this phantom is actually faster, an advantage that can be used when organizing data bases. Information that is frequently accessed can be put on the outer logical spindle for improved system performance.

Calcomp has chosen the other route for setting up two spindle geometry, interleaving the two phantoms. Thus the first track will seem to the operating system as spindle A, the second as spindle B, the third as spindle A, and so on.

This makes the average access time of both spindles equal, removing the advantages – as well as the possible headaches – of the inner/outer approach.

Calcomp can only mount four dual and one single drive on its controller at the moment, while the others all go up to eight duals plus a spare.

Operating system problems can arise from the two logical spindle approach. If the operating system decides a spindle is not being used, it directs the operator to remove it. It may turn out, though, that in removing that phantom spindle, he is also removing a phantom that is being used. So all three manufacturers have developed various software override methods to cope with the problem.

Telex Differs

Telex, on the other hand, has made an end run around the question. It treats the double density disk as one, 406-track 2314. And rather than trying to be transparent to the operating system, they rewrite that portion concerned with 2314 device control.

Software is a problem for the independents in other ways, too. Any program that is dependent on precise 2314 timing is in trouble, since all the drives operate faster than 2314s.

In a totally different approach, Memorex has left the number of tracks per disk the same as on the 2314, and doubled the linear information density. They accomplish this by changing the

(Continued on Page 31)

Tektronix CRT Handles Hard Copy And Data for 20 Minicomputers

BEAVERTON, Ore. – Tektronix Inc. has introduced a business-oriented CRT terminal with both Alphanumeric and graphing capabilities for less than $4,000.

The 4010 system can interface with 360/370s including Model 40 and up, in addition to attaching to most minicomputers. The system has both hard copy and data communications features.

For alphanumeric use the 4010 generates 5 by 7 dot matrix characters from a 63-character set. Up to 2,500 upper-case characters can be displayed on the 11-in. display.

In the graphics mode, vector points can be located by use of a "thumbwheel controlled crosshair cursor." The Plot-10 software available with the 4010 is said to allow graphic interaction with 20 time-sharing and 20 minicomputers. Compatible CPUs include systems from DEC, Data General, Varian, Honeywell, Interdata, and Raytheon.

The minis are interfaced through software packages written in assembly language at $600 per system.

A data communications interface is available for 150 to 9,600 bit/sec at no cost. A more deluxe model with switch selectable speeds from 110 bit/sec up costs $600/mo. A hard copy device can be attached.

The 4010 costs $3,950 or $170/mo with maintenance on a three-year lease. The hard copy unit can be used only with the 4010-1 version which costs $4,250

1410 CRT

Infotec Has 1403-Type Printer for 1130 Users

PLAINVIEW, N.Y. – Infotec Inc. has added a 1403-7, 600 line/min. printer for IBM 1130 users with features not available on the standard unit.

Called the PS-1130, the Infotec printer can operate with Storage Access Channel 1 on the 1130. This capability means the user can avoid attaching an 1133 channel multiplexer, according to a spokesman, thereby saving about $250/mo.

The printer improves on IBM's 1403 features by including a variable width paper handling capability for printouts from 3.5- to 19 in.

The PS-1130 costs $19,000 as compared with the IBM 1403-7 which sells for $26,900. It is available on a three-year lease for $796.50/mo with maintenance supplied by Honeywell.

Tape Prices Cut

In a related announcement, Infotec has increased the speed of its 1130 tape system from 5 in./sec to 7.5 in./sec, while lowering the price from $11,000 to $8,700.

The 1130 A tape system includes complete hardware, software, and service. It uses standard IBM compatible tape reels. Infotec is at Newtown Road, 11803.

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Microdata 1600/21 Programmable Mini Has Modular Design for Under $5,000

SANTA ANA, Calif. – Microdata Corp. has introduced the Micro 1600/21, a general-purpose processor with a microprogrammable control memory. A full line of peripherals is scheduled to be added soon.

The CPU has an instruction set with 107 operations including multiply/divide, stack processing, character string manipulation and extended arithmetic with up to 16-digit decimal accuracy.

The 1600/21 has a modular design that permits simplified expansion of the system as required. Main memory can be expanded from a basic 4K bytes up to 32K bytes. Control memory has a capacity of 1K, 16-bit words. Cycle time is 200 nsec.

An important feature is the capability to expand system architecture by adding application firmware in the control memory up to a total capacity of 16K words.

A typical system with 8K bytes of main memory, TTY controller and a systems control panel is priced under $5,000. Maintenance is available at extra cost. Deliveries are scheduled to begin in November.

Peripheral Line

A full line of peripherals will be announced soon for use with the 1600/21, a spokesman told CW. Included will be disk, tape, and printer drives, in addition to paper tape and card equipment.

A moving head cartridge disk unit will cost "under $12,000 in 2.5M bytes configuration and $13,000 in a 5M byte size. A 150 line/min printer will cost under $10,000."

A paper tape punch and reader device will cost about $4,000. The punch portion will operate at 75 char./sec while the reader will handle 300 char./sec. A 200 card/min reader for punched cards will be available for about $4,000.

A mag tape system will handle 7- or 9-track IBM compatible data at 10,000 char./sec. The system will cost about $5,000 for one transport with controller. The peripherals will be available 90 days from date of order, a spokesman said. Microdata is at 644 East Young St., 92705.

What a customer looks for in an OEM Supplier

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for rates, mechanical requirements, and shipping instructions. Or call the *Computerworld* representative nearest you.

IBM Moves Disks To Buy-Only Policy

WHITE PLAINS, N.Y. – IBM will no longer provide rental agreements for new users of its 1316, 2316 and 5440 disk packs. The 1316 is used on 2311 drives; the 2316 is used on 2314 and 2319 drives; and the 5440 is used on System/3.

In instituting the purchase-only policy on the packs, IBM said there would be no change in prices and current lease contracts will be unaffected.

For new or convert-to-purchase packs, repair certificates for one repair within three years on a specified pack will be able to replace present lease plan maintenance. The certificates will cost $15 for the 1316 and $35 for the 2316.

The changes were effective on September 1 when IBM transferred disk pack marketing from the DP Division to the Information Records Division.

Double Density Systems Have Varied Track Layout

(Continued from Page 29)

coding algorithm.

In normal 2314 coding, a clocking pulse is used to denote the beginning of a data bit. The Memorex system uses this clocking bit as an information bit, using a technique similar to phase encoding, in much the same manner as IBM runs the 3330.

This doubles the linear density of the data, but keeps the tracks the same width. Memorex contends that the 2314 disk pack was designed to work reliably "within the framework of 7 mil track width," and that its approach offers "to meet all established standards of reliability."

Because the data is coming in twice as fast as the disk spins under the head, data transfer rate is doubled, which 360s can accept. Memorex has also cut the rotational speed in half, to 1,200 rpm. This has the disadvantage of doubling latency time, leading to poorer performance.

Memorex said it is conducting tests to see exactly how serious this problem is under various usage conditions.

In order to convince OS users that it has a 2314 that's twice as big, Memorex also has to do some minor patchwork on the device characteristic table. This is easy under OS but difficult under DOS, so Memorex will not support its drives on the disk system.

The maximum configuration is eight drives plus spare, and only dual density drives are allowed.

There's no easy answer to which of the five is the best solution. Users will have to evaluate them all.

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KEYNOTE ADDRESS AND LUNCHEON SPEAKER

The conference will open with a Keynote Address by Dr. Arthur G. Anderson. Dr. Anderson recently completed a year as a Visiting Fellow at the Center for the Study of Democratic Institutions, and is currently Vice President and Director of Technical Assessment for IBM Corp.

The Conference Luncheon will be highlighted by the presentation of the Harry Goode Memorial Award and a featured address by Dr. Frank Ryan, Director of Information Services for the United States House of Representatives and former professional football celebrity.

EXHIBITS - ONLY REGISTRATION

A $10 exhibits-only fee will be available all three days of the conference. Although such registration cannot be made in advance, you can ensure accommodations of your choice by mailing the housing form with your accompanying deposit.

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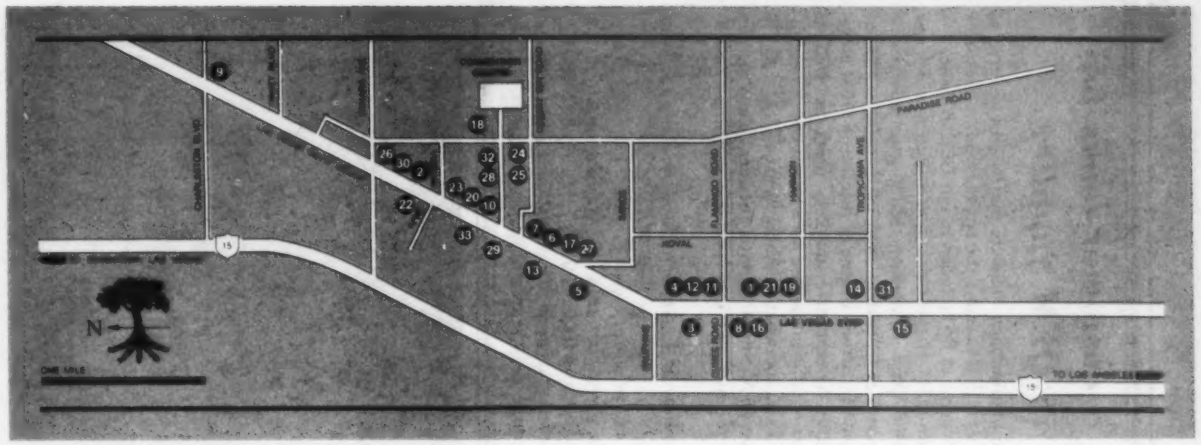

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Clear Explanations

'First Course' Has Wealth of Exercises

By Albert Schild
Special to Computerworld

Computer Science: A First Course, by Forsythe, Keenan, Organick, and Stenberg, John Wiley and Sons, Inc., New York, 1969, 553 pages, $9.95.

This very well written book is the outgrowth of a School Mathematics Study Group [SMSG] project undertaken during 1964-66 by an outstanding group of educators and computer scientists. The authors of this book were members of that group.

Book Reviews

The book abounds with illuminating sketches, graphs and flow charts. Multicolored figures are introduced very expertly to illustrate fine points and new ideas. The explanations are clear and down to earth.

This book can be highly recommended for introductory courses in computing both at the high school and college levels.

The introductory unit discusses the basic concepts such as algorithms, flow charting, loops and approximations.

The second part deals with numerical applications and includes a variety of numerical analysis topics such as solution of equations, maxima and minima of a function, solving systems of equations, averaging, and problems of statistics. Non-numerical applications, with excellent discussions on trees, Polish strings, string operations and compiling comprise the third major section of the book.

An appendix describes a hypothetical computer, Samos.

A particularly attractive feature of the book is the wealth of interesting and non trivial problems and exercises, whose solution can be obtained relatively easily on the computer, but whose non computer solution would be rather tedious, such as: "Find all the three digit numbers that are equal to the sum of the cubes of their digits." These, more than anything else, will convince the students of the power of the computer.

The power of the computer to solve "theorem like" problems is also illustrated.

Albert Schild is chairman of the mathematics department, Temple University, Philadelphia, Pa.

Interactive Systems Survey Gives Reader Jumping-Off Point

By William W. Cotterman
Special to Computerworld

Man-Machine Communication by Charles T. Meadow; John Wiley and Sons, Inc., New York, 1970, 422 pages, $13.95.

In this survey of interactive systems the author examines communication devices, programming, time-sharing and natural language communication and then proceeds to a presentation of four basic and four advanced interactive systems.

The chapters on devices and programming are rather standard but the discussion of time-sharing is distinguished by the presentation and discussion of several pertinent algorithms covering program selection, memory allocation, and input initiation and queue management.

The applications chapters are well written and interesting. In each case the author presents detailed examples including sequences of commands and responses.

The reader can expect to gain an appreciation of the nature and potential of interactive systems from this book. Additional readings are recommended for each topic and the book is a convenient jumping-off point for an introduction to this very important subject.

William W. Cotterman is president of Computer Educational Services, Atlanta, Ga.

PL/1 Text Updated, Shows IBM Changes

By W.S. Hoffman
Special to Computerworld

Programming Language/One, Second Edition, by Frank Bates and Mary L. Douglas, Prentice-Hall, Englewood Cliffs, N.J., 1970, 492 pages, $8.50.

This book is essentially the same as the 1967 edition, except changes have been made to the text and illustrations to remain compatible with IBM's changes to PL/1. There are few errors, although a number of unimplemented items remain.

The title notwithstanding, one of the two purposes of the book is to "explain some of the techniques of using computers." A few chapters on extremely elementary subjects are presented and most illustrations are rather elementary.

This reviewer found reading the text, which consists of reproductions of non-justified, triple-spaced, typewritten information, very tiresome.

W.S. Hoffman is with the Information Systems Division of E.I. DuPont de Nemours, Inc.

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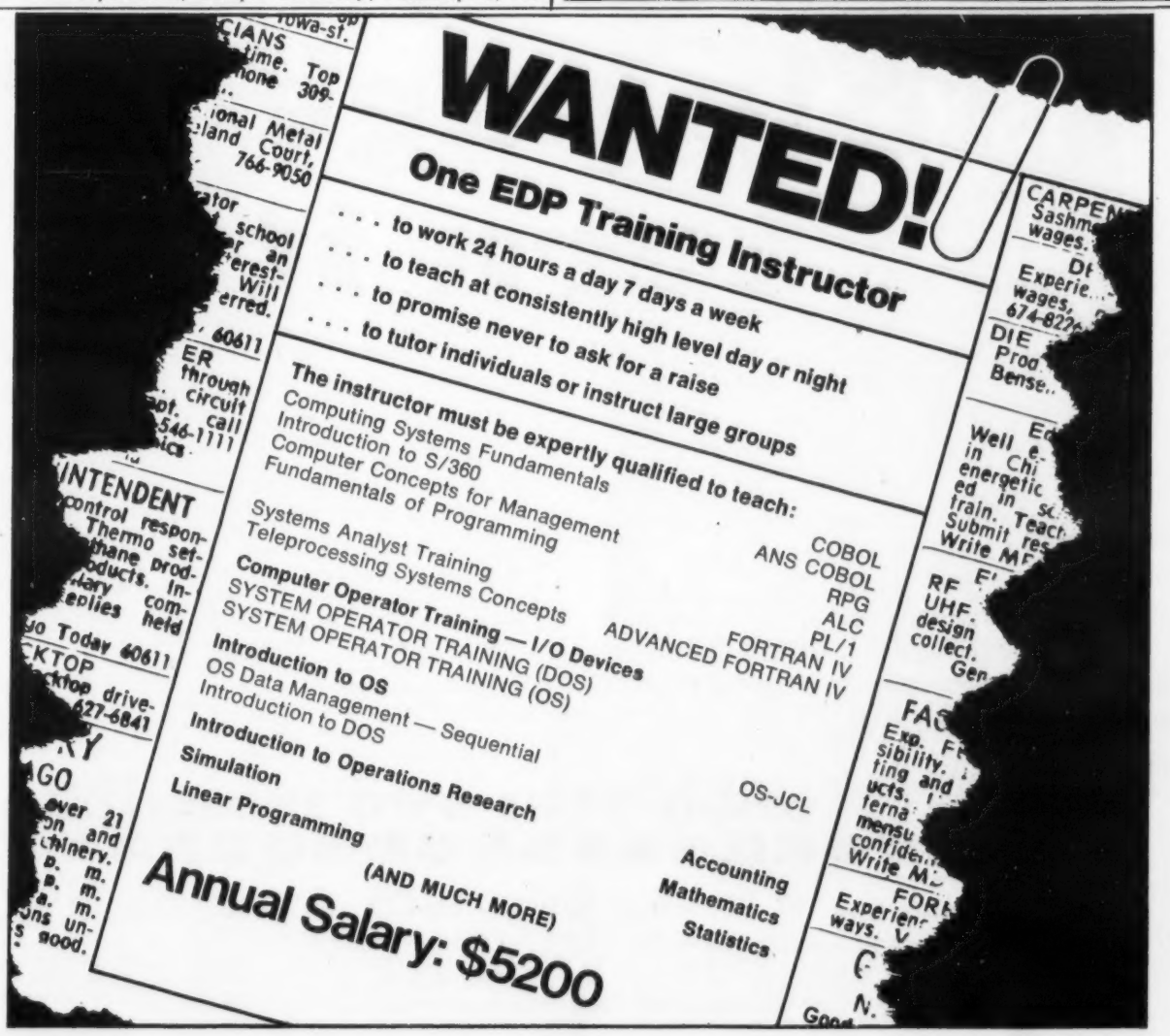

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Charge It, Please

Employees at IBM's computer development laboratory in Boeblingen, West Germany, can use their regular IBM identification cards to charge lunches in the lab cafeteria. The cashier keys the amount into an experimental data entry terminal built around a modified IBM 050 magnetic data inscriber and the employee pushes her card into a slot. The terminal reads the employee's ID number from the badge, records it with the amount on magnetic tape, and gives a receipt. Later the tape goes to a computer which deducts the employee's monthly charges from her salary.

Concrete Maker Happy With 3rd Input System

EL MONTE, Calif. – Moving from seven keypunch machines in a trailer, to five key-to-tape systems in a data preparation room, to a key-to-disk system in half a data preparation room took little more than a year at Livingston-Graham, Inc. In the process, producers of ready mix concrete reduced errors, cut data entry costs, saved computer time and eliminated punched cards altogether.

The re-evaluation of data preparation and entry techniques began in early 1970 when the company replaced its Univac system with a Burroughs 500. During the conversion, Livingston-Graham had to move its keypunch/verifier machines into a trailer to make room for both computers.

Data preparation activities returned to the firm's building in March, 1970, in the form of five key-to-tape machines – individual systems that allowed operators to enter data directly to tape.

'Eliminated Cards'

According to Jerry Young, director of data processing at Livingston-Graham, "The new equipment eliminated punched cards but created other problems in operator training, error verification, computer time usage and space requirements. It served adequately as an interim solution, however."

A year later, the company installed an Inforex Intelligent Key Entry System with five terminals.

The biggest advantage gained from the system is being able to see the whole record rather than just a character at a time as was the case with the key-to-tape system, according to Young. "We've had a fantastic increase in accuracy with a corresponding decrease in the number of errors," he stated.

Blocking Helpful

Livingston-Graham's only added option to its standard system is a tape handling enhancement called blocking, where record lengths and blocking factors are designated at the time of data transfer. Young said the blocking increases input speed.

The data preparation function at a concrete company enters data for all accounting functions – accounts payable and receivable, payroll, journal entries, etc. – and provides delivery ticket and fuel ticket data.

Delivery tickets are produced for each load of material to be shipped. They provide all pertinent data for proper delivery and record keeping. The delivery ticket operation is the highest volume job performed on the key-to-disk system.

A preventive maintenance program for the company's vehicles is kept through the fuel ticket data collection process. By tracking fuel consumption on company trucks from the fuel tickets, the system records data that tells Livingston-Graham mechanics when maintenance must be carried out.

A single program for the Burroughs computer accepts all input from the input system.

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Dr. Russell Sandberg, associate professor of medicine in the university's school of medicine here, said 16 towns are linked to the computer, with several others waiting in line.

Sandberg said the system is serving as a major test of the computer as a diagnostic tool, but may also provide answers to the problem of providing adequate medical care to isolated populations.

The only equipment required at remote clinics is an "acquisition cart" for electrocardiograms (ECGs), a signal recording device, and a telephone hookup.

Spirometers are also used to collect lung capacity data, which is also transmitted over the telephone.

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"In most of the cases where the computer's judgment has been overruled," Sandberg said, "it has been a case of the computer being overly cautious.

"This is the way it should be," Sandberg remarked, "with the computer picking out all questionable tracings for the cardiologists' final judgment."

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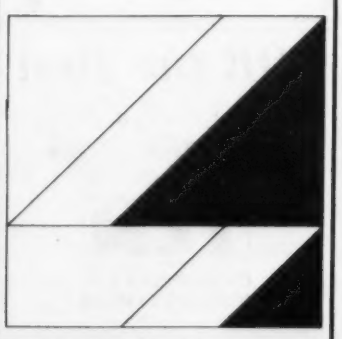

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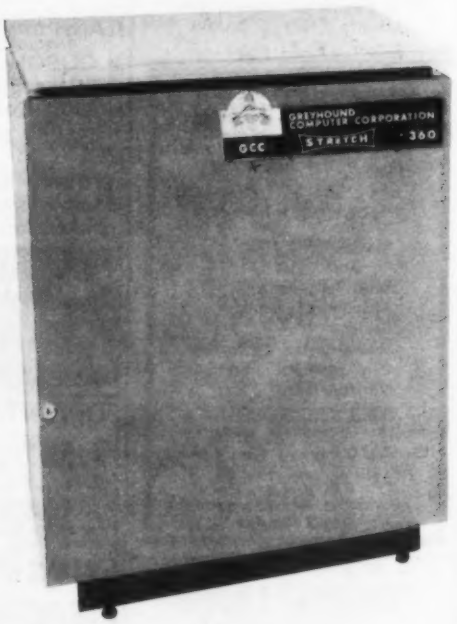

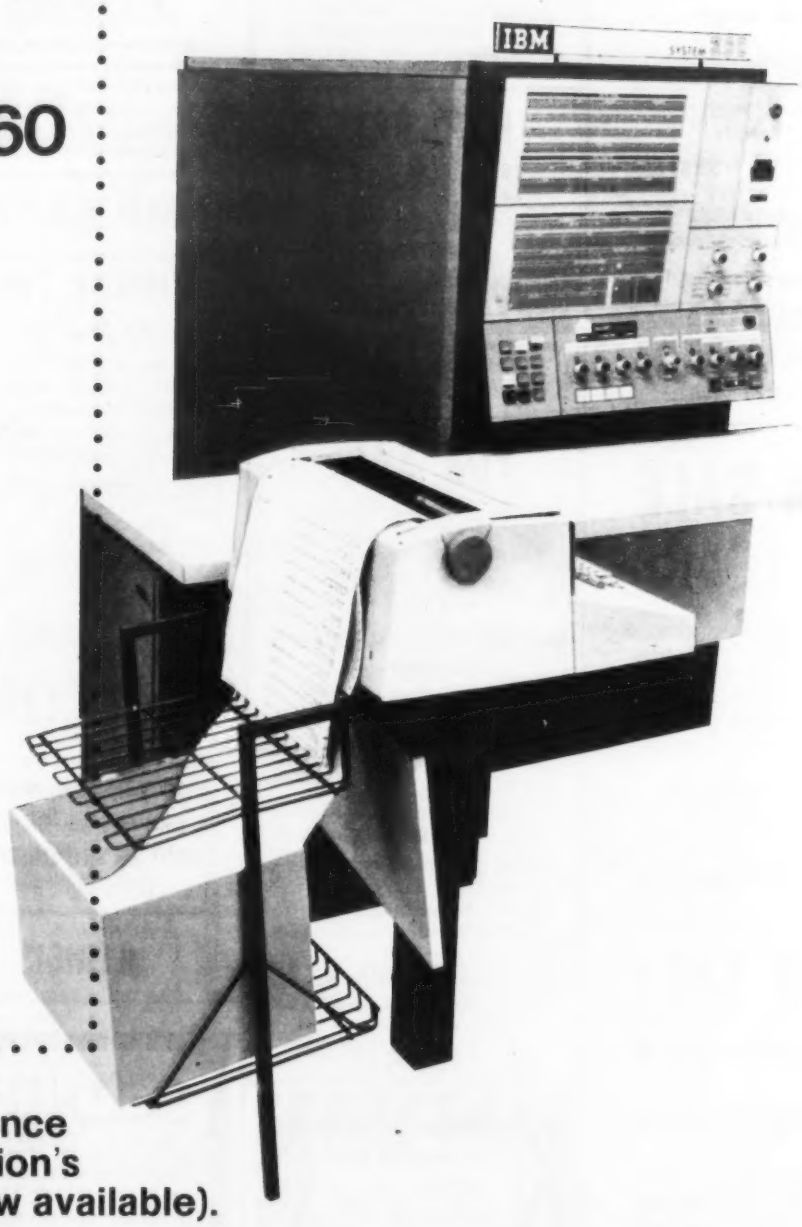

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computer industry

a Computerworld news section about the nation's fastest growing industry

October 13, 1971

CI Notes

U.S. Buys Used Computer

WASHINGTON, D.C. – The Department of Labor has become the first government agency to purchase a used computer – an IBM 360/65 J. It was sold by the Summit Computer Corp. for Esso's Research and Mathematics center.

Telex to Use SMS Circuits

TULSA, Okla. – Another firm may begin offering semiconductor replacement units for core memory systems, joining Advanced Memory Systems (marketed by Itel) and Cogar.

Telex has signed a contract with Signetics Memory Systems under which SMS will provide "an advanced type of memory circuit which will be incorporated by Telex in memory systems which will be sold or leased as replacements for memory systems produced by major computer manufacturers."

Quantum Sues TRW

PALO ALTO, Calif. – In yet another suit charging pirating of computer industry marketing information, Quantum Science Corp. has charged TRW Inc. for illegally obtaining a copy of its study on network information services.

Quantum is asking for actual damages in the amount of $10,800 plus accrued interest and an additional $100,000 in punitive damages.

Supershorts

Opening ceremonies for the Bema Business Exposition will take place on a holiday, Oct. 25, thanks to the new Monday observance of Veterans Day and most other holidays.

– – –

Microdata has merged Micro Systems, Inc. into the Microdata Corp.

– – –

After five years of marketing through an exclusive intermediate distributor, Kalvar Corp. has launched a direct marketing program for its film products.

– – –

Infoton, Inc., a newly acquired subsidiary of Optical Scanning Corp., has landed an order for 1,000 CRT display terminals from Singer Friden. The value of this order is estimated at about $2 million.

– – –

Inside Report From RCA

Move Leaves Employees Confused

What was it like to work in RCA's Marlboro, Mass., facility after the announcement was made? This is one employee's personal story of the first two weeks.

Typical Friday after five . . . Usual crew of stay-lates, finishing up for the weekend. Awkwardly, a middle-management-type you barely know calls you together and begins reading from a fuzzy Xerox copy. ". . . RCA has decided to withdraw from the general purpose computer business . . ."

Others drift up as he reads, so he reads it again, hands shaking. Posted near him is Ed Donegan's "unequivocal" July memo to all employees, on how RCA is in the business to stay.

He has no further information, no answers – but there are few questions, just absolutely stunned people. At least you didn't learn about it from the papers, like almost everyone else eventually did.

Idle thoughts as you call your boss and a few friends at home, to let them know. Eleven years in aerospace without a layoff, and you took this job largely for the stability and the futures it offered. It takes you almost an hour to go through the motions of cleaning up your desk for the weekend.

The usual Friday-after-work gathering at a local bar is still on – most had left before the announcement. It must be a wake now, quite appropriate here in Massachusetts, the unemployment capital of the Northeast.

You don't go, have to go home and tell the wife. One guy's wife broke down when you called – they'd just moved into their new house a week ago, after a month in a motel.

The weekend newspapers have it, but no details. You dig out your resume, and call your real estate broker. He is none too enthusiastic, the Marlboro market has suffered a sudden decline, it seems. Should you sell the second car?

Monday. Everyone in on time for a change. It's official, guards everywhere, ranging from officious to Nazi-like. For the first time since the bomb scares, you have to show a badge to get in. And your personal papers are searched, page by page, as you leave. If it's all that valuable, why are they killing it off?

No information, just an unsigned policy memo from Ed Donegan – continue to perform your duties, absences will be dealt with, obligation to our customers and information will be passed along as it is received. But no information as to how it affects you. Late in the day, another gem – "absolutely imperative" you not talk to the press. Talk about what? We don't have any information, we're getting it all from the press.

The rest of the week is a study in the psychology of defeat. Most of the groups have been working short-handed and long hours for months, trying to outdo IBM with 10% or less of its resources, and

(Continued on Page 47)

CDC/IBM Litigation Heats Up With Added Claim, Counterclaim

MINNEAPOLIS – The Control Data suit charging IBM with antitrust abuses appears to be heating up again, with CDC answering IBM counter charges and filing a new claim in the space of one week.

In its counterclaim, CDC and its subsidiary, Commercial Credit Co., denied IBM claims that they had engaged in violations of the antitrust statutes.

At the same time, Commercial Credit filed a treble damage claim against IBM as a user of IBM equipment. The suit alleges that IBM is guilty of monopolization and that it charged prices for computers in excess of normal, competitive prices, both before and after Commercial Credit was combined with CDC.

IBM said that it would not comment on the moves.

European Keypunch Replacement Markets Seen Growing Rapidly

LONDON – European computer users, like their American counterparts, are moving rapidly away from the keypunch and seeking new systems for data capture, according to IDC Europa here.

In 1968, keypunch/verifiers accounted for 60% of the installed data capture equipment, but their share has dropped by 10%, a study of 1,100 installations revealed. By the end of 1972, keypunches will account for only 23% of the data capture equipment market, the firm predicted.

The study, which was confined to Germany, France and the UK, found that 80% of all users presently spend between 6% and 20% of their hardware budgets on data capture equipment. About 40% expect to see that proportion increase, while only 22% see a decrease in data capture equipment expenditures.

While most users want to replace their keypunch operations, no other technology has gained the upper hand as the replacement medium in the minds of European users, IDC Europa said.

Key-to-tape and key-to-disk systems, however, were often listed as possible replacements, ICD Europa said, and the market for this type of equipment should be expected to grow at least 25% per year.

Direct input of data is favored by many users to the extent that by 1972 40% of the data capture equipment sold could be of this class, the firm predicted. OCR and Micr markets remain relatively static, the firm added.

The major difference between the three countries studied was the emphasis on communications, the report said. In both the UK and Germany interest in these types of systems was high, while the interest was low in France.

Independents Will Protest Nasa Award For Peripheral Gear

CW Washington Bureau

WASHINGTON, D.C. – The Computer Peripheral Manufacturers Association was poised last week to protest to the General Accounting Office a sole source contract awarded by the National Aeronautics and Space Administration to IBM. The award is for $1.77 million to convert 146 IBM tape drives and controllers from lease to purchase.

Richard Caveney, CPMA's president, said he has, in addition, filed a protest with one congressional committee and plans to contact two more.

Caveney adds that if a peripheral maker had won the award, Nasa would also be getting new equipment, "not outdated equipment."

Caveney added that if Nasa had "only taken the price Storage Technology Corp. got in its recent award from the Internal Revenue Service, they would come up with lower figures than they got from IBM."

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Librascope Adds to L107 Disk Series

GLENDALE, Calif. – Librascope Division of The Singer Co. has added a new unit to its L107 series disk memory line which provides up to 18 Mbits of storage capacity on 256 data tracks.

The new memory, designated L107B, has TTL, NRZ electronic interface similar to other L107 models. The L107 is available with either 8.5- or 17 msec average access time with a 2 MHz bit rate.

The unit features flying head-per-track design and is ruggedized for industrial applications.

Price of the L107B 128 track model is $7,450, in 1-9 quantities with 90 day delivery from the firm at 808 Western Ave., 91201.

Novation Shows Line of 103-Compatible Plug-In Modems, Acoustical Couplers

TARZANA, Calif. – A line of 103-compatible, plug-in modems and acoustical couplers from Novation is designed specifically for OEM built-in applications.

The single circuit-board assemblies provide any combination acoustic or direct access interface in originate only, answer only or answer/originate modes. The units are compatible with 103-type modems and WE 500 type handsets.

Transmission is FSK phase coherent with half- or full-duplex selectible by external control.

Signal voltage levels are TTL-compatible and power supply requirements are +5 V, -12 V, and +12 V. Interface connections, either printed circuit edge contacts and/

New OEM Products

or optional 14-pin dual in-line connector, also provide test access, upright/inverted frequency selection, phone line monitor, end-to-end loop test, and voice capability.

Unit price in lots of 1,000 with complete acoustic coupler assemblies is $150 (EC-102A, originate only and EC-104A, answer only); $180 (EC-103A, answer/originate). The price for direct access assemblies is $140 (EC-102AD, originate only and EC-104AD, answer only); $180 (EC-103AD, answer/originate). The company is at 18664 Oxnard St., 91356.

Magnafile Disk, Controller Bow

PHOENIX, Ariz. – Magnafile's new Model 6400 head-per-track disk offers 128K to 512K 16-bit words of storage. Average access is 17.4 msec and the data rate is one word every 8 μsec.

Price is about 0.1 cent/bit with quantity discounts available. The unit also comes in 3,450 RPM and 50 Hz versions. The Magnafile Series 100 controller is capable of handling up to four Model 6400 memories and includes a specific interface for any of the popular 16-bit miniprocessors. The firm is at 2602 E. Magnolia, 85034.

MOS ROM Is Field-Reprogrammable

SANTA CLARA, Calif. – Intel Corp. has introduced a 2K-bit MOS ROM that can be erased and reprogrammed in the field. The E-ROM is programmed electrically, using a manual programmer or an automatic tape-actuated programmer. It is erased by shining light from an ultraviolet lamp through a transparent quartz lid on the package, a 24-pin ceramic DIP.

The Intel 1701 is a dynamic/static MOS memory with 650 nsec access time, and Intel 1702 has static-only MOS memory with 1 μsec access.

The 1701 is priced at $200 and the 1702 at $184 in small quantities, according to the firm at 3065 Bowers Ave., 95051.

ROM Is Designed for PDP Users

SUDBURY, Mass. – A random access read-only memory from Memory Technology, Inc. is designed for present users of the PDP-8i and PDP-8L.

Featuring capacity additions of 1K- to 32K words, the ROM includes controls needed to interface with the PDP-8's data break, mechanical chassis for rack mounting in the PDP-8 cabinet, power supply, and a complete software system. The firm is at 83 Boston Post Rd., 01776.

Ambient Coupler/Recorder Bows

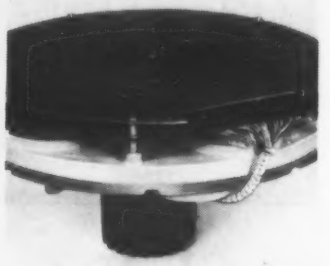
SANTA CLARA, Calif. – Ambient Systems' new Dataspan 503 coupler/recorder is designed for both on-line and off-line data acquisition and is particularly applicable to generating computer-compatible input from such sources as environmental and process control systems, electronic circuit testers, and scientific instruments, the firm said.

The 503 will accept TTL and DTL logic as well as contact or switch closures as a data source. It converts decimal or BCD information into computer-compatible input data and also provides a punched paper tape record of the data.

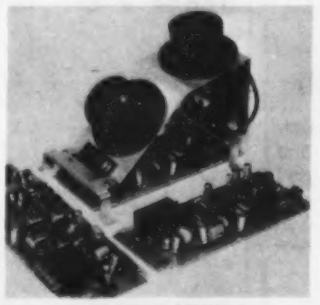
The unit has a programmed 18- or 30 character memory module to generate and insert identification and housekeeping characters.

The unit, which is priced at $2,495, comes in either desk top or rack mount configuration and is also available in a coupler only version for direct interfacing with teletypewriters, mag tape recorders, cassette recorders and modems, the firm at 3020 Scott Blvd. said.

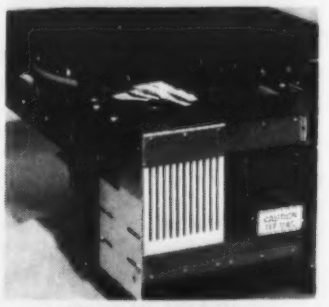
Ambient Dataspan 503



Librascope L107B Disk System

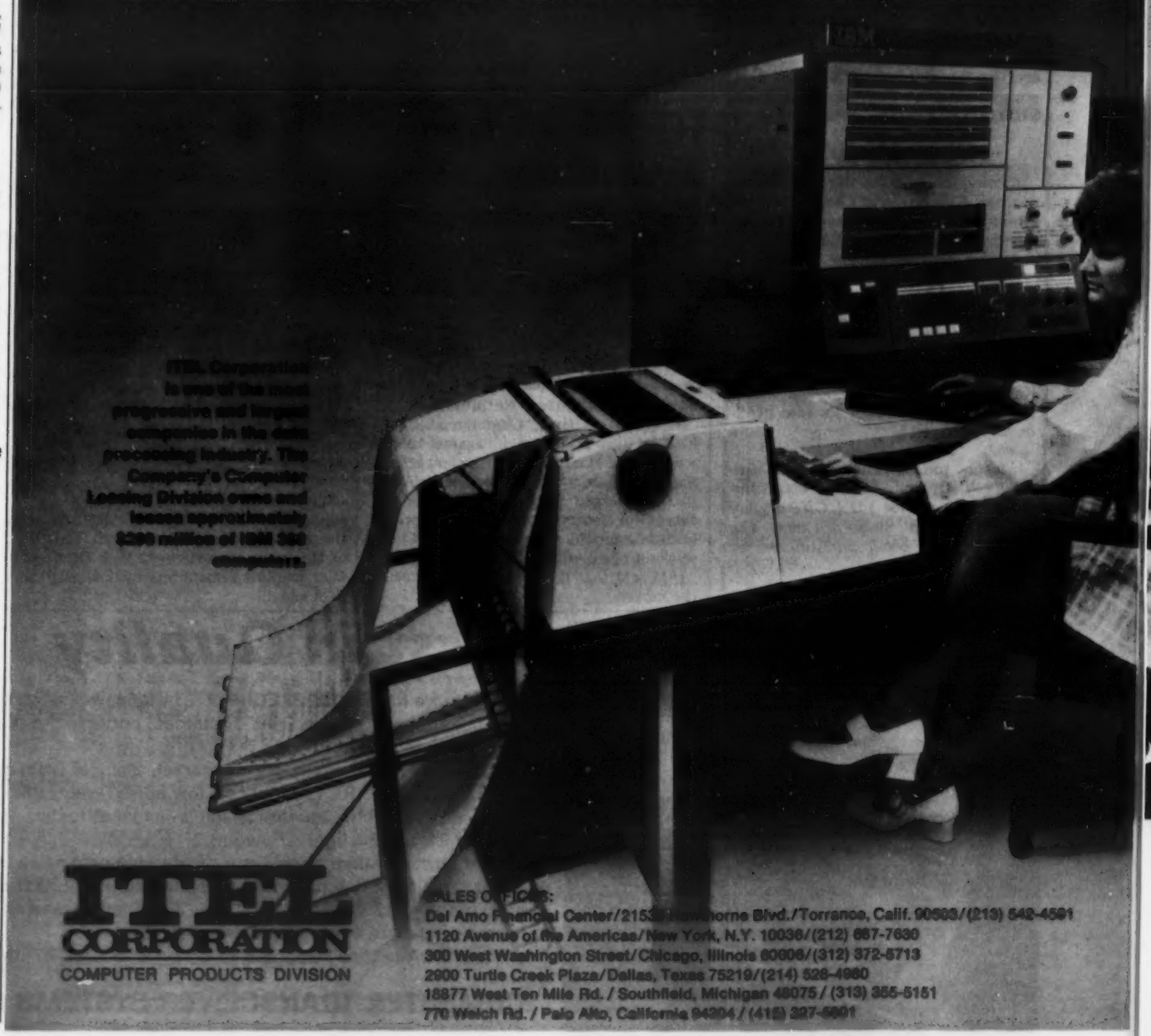


Novation Modem



Magnafile 6500 Disk

MONOLITHIC MAIN MEMO



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Software Firms React

Government Software Procurement Report Criticized

By Alan Drattell
CW Washington Bureau

MCLEAN, Va. – A general Accounting Office report which hit software dollar waste in the Federal Government last summer [CW, July 21] has been sharply criticized by the Association of Independent Software Companies, based in this Washington suburb.

Referring to the GAO report on the "Acquisition and Use of Software Products for Automatic Data Processing Systems in the Federal Government," an ad hoc study group from AISC said that although GAO's observations "appear to be accurate, some of the implications and conclusions in the report are faulty.

"The basic weaknesses of the report are its consistent use of *incomplete* data, and its failure to point out the small usage of commercial software products by the government. On the other hand, it errs in emphasizing relatively trivial cost savings and failing to emphasize major management problems."

The GAO report said essentially that Federal agencies are spending nearly $3 billion a year for software but they don't have any centralized direction or guidance in what they're doing. The result is often duplication of effort and/or purchase.

The AISC group, analyzing the GAO report as it relates to software products produced by independent vendors and marketed under contract to computer using organizations, concludes:

- "Present government procurement policies do not recognize adequately the advantages available to the government through effective use of good software products.
- "These policies disparage and attempt to take unwarranted advantage of low-unit price (retail) marketing of software products.
- "The GAO report claims that varying prices for the same items constitute questionable procurement practice. This is untrue in all of the cases GAO quoted.
- "Present policies attempt to establish that the government is a single purchaser. Except for superior/subordinate multiple procurements, this is unrealistic.
- "GAO's attempt to force source language distribution of responsibly maintained software products is not justified.
- "The GAO report's suggestion that government-sponsored research should favor elimination of compiler software is not justified; its recommendation for more research on algorithm devlopment and testing is well justified.
- "Government central agency evaluation of software products should consist of validation of general qualifications and of adherence to standards, and advice on election criteria, and should avoid all-purpose selection and competitive evaluation.
- "Software product protection is now inadequate to encourage investment. Attempts are being made by the government to further weaken such protection. The government, as well as other ADP users, benefits from existence of good software products and should not thus discourage their development."

Orders and Installations

A Honeywell 6070 system has been air shipped from that firm's Phoenix facility and installed in the headquarters of Credito Italiano in Milan, Italy – the first overseas customer to receive a 6000 series computer.

The system, the first of two ordered by the bank, includes 128,000 words of main memory, 12 magnetic tape units, 26 disk drives, two printers, two card readers, two card punches, and a Datanet 355 communications processor.

American Motors has become the first company to receive an IBM System/7. The system will be used in the firm's Toledo Jeep Plant as part of an exhaust emission control program designed to reduce air pollution. The firm has another system on order for its Kenosha, Wis., plant.

An IBM 370/145 will be used by the city of Wichita Falls, Tex., as part of a prototype city management information system that is being funded by a $3 million grant from the federal government for programming development. The system will be used to create a central information file for all city agencies and city-owned utilities, including the water, sewerage and sanitation departments and the city-owned bus system.

The Leicestershire County Council in England has ordered a Univac 1106 that is scheduled for delivery in 1973. The county will use the system to develop a data base for planning purposes and to provide remote job entry facilities for county departments.

BPA Byggproduktion AB, Scandinavia's second largest construction firm, has ordered a Honeywell 6060 system valued at more than $4 million for its Stockholm, Sweden, headquarters.

Walt Disney Productions Inc. has ordered two Keylogic systems from Redcor Corp. The systems will be installed in Burbank, Calif., at Walt Disney Studios and at the new Disney World in Orlando, Fla.

The Norden Division of United Aircraft has become the first company in Connecticut to install an IBM 370/155. The system, at the firm's Norwalk plant, will be used for inventory control, basic accounting, shop loading and scheduling functions.

Honeywell 115s have been ordered by Amalgamated Meat Cutters Union, Local 342, Jamaica, N.Y.; Mount St. Mary's Hospital, Lewiston, N.Y.; National Southwire Aluminum Co., Pittsburgh; New England Toyota, Woburn, Mass.; Town of Hamden, Conn.; Quaker Lace, Philadelphia; Adamas Carbide, Kennelworth, N.J.; and Ulbrich Stainless Steels and Speciality Metals Co., Wallingford, Conn.

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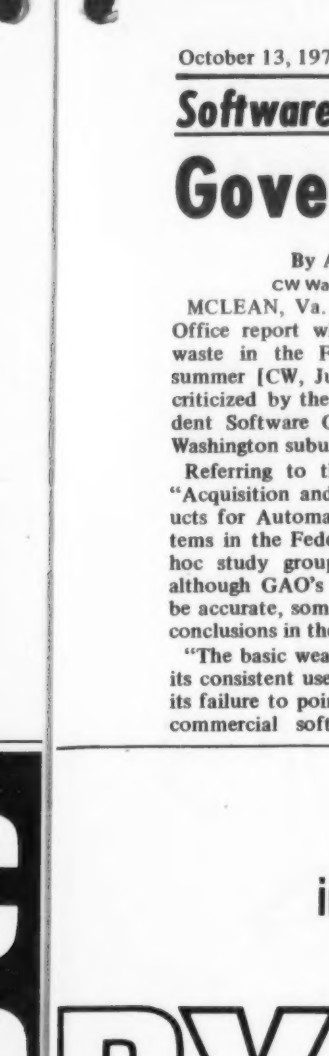

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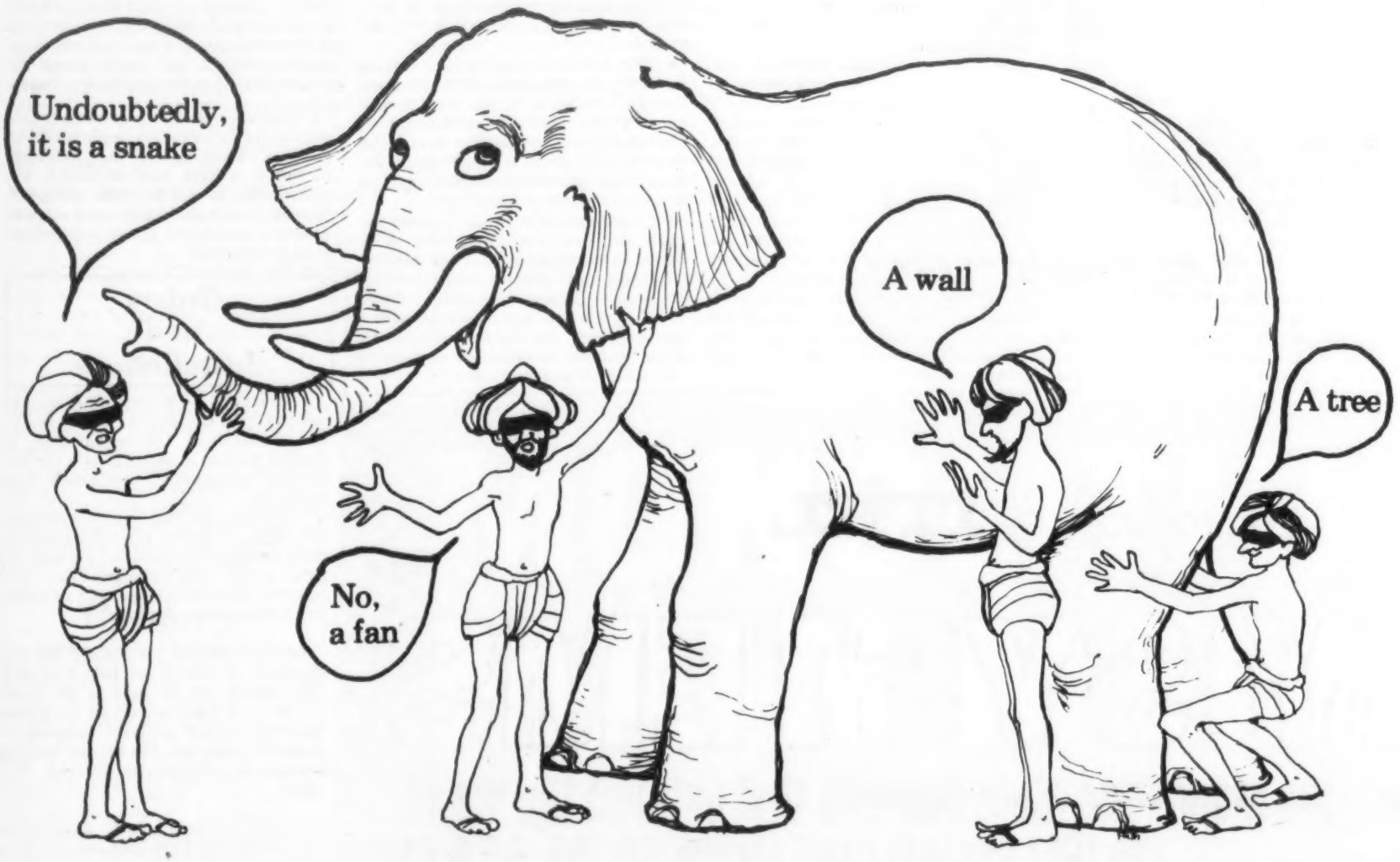

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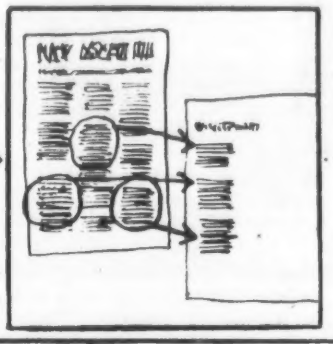
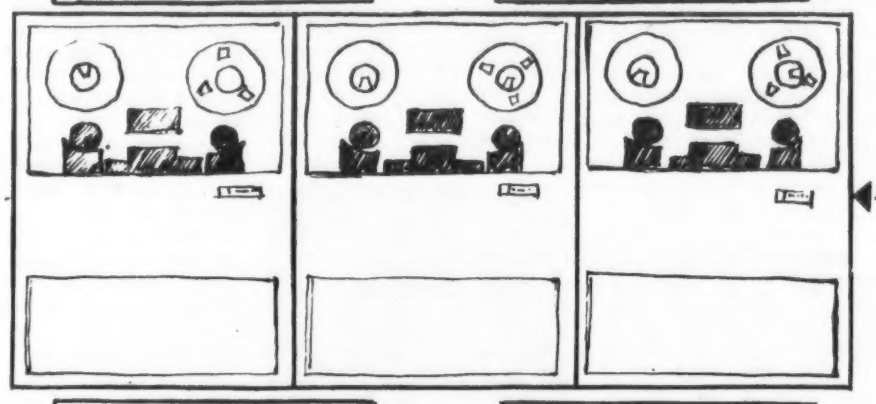
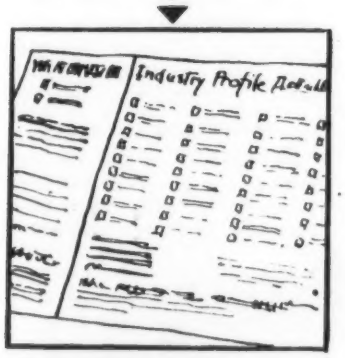


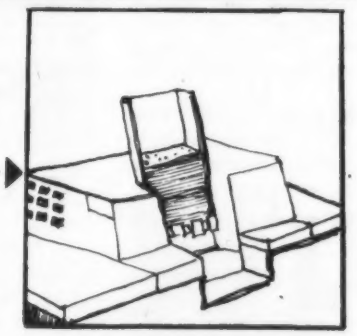
About 6,000 digests per month are then entered into our computer system.



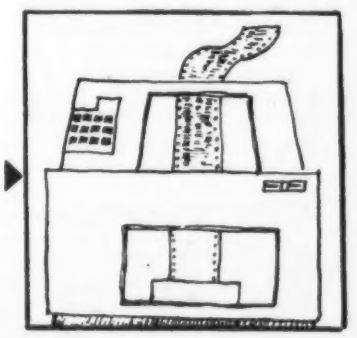


When your order is received...

...Your selected subjects are then keypunched to comprise your "interest profile."



Each month, your "interest profile" cards are then exposed to the new month's file of 6,000 abstracts. A unique computer system then examines every article for relevance to your interests.



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- ☐ Peripherals
- ☐ Services
- ☐ Software
- ☐ Supplies
- ☐ Terminals

2 Analysis Factors

- ☐ Abuses
- ☐ Applications
- ☐ Contracts
- ☐ Costs
- ☐ Education
- ☐ Foreign Trade
- ☐ Installations
- ☐ Languages
- ☐ Leasing
- ☐ Legislation
- ☐ Licensing
- ☐ Litigation
- ☐ Malfunctions
- ☐ People
- ☐ Prices
- ☐ Regulations
- ☐ New Products
- ☐ New Services
- ☐ New Systems
- ☐ Patents
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4 Companies

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The Ante Got Too Steep

After Sixteen Years, RCA Cashes in Its DP Chips

By Michael Merritt
Of the CW Staff

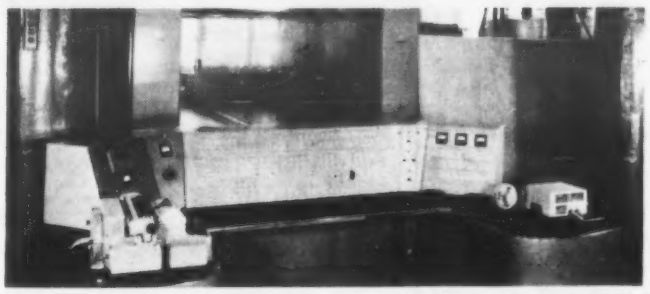
Of the many ways it could have chosen to leave the computer business, RCA chose the one most in keeping with the history of its EDP operations – unfortunate.

The House That Sarnoff Built scored a few notable successes in its 16 year flyer in the computer game, but it will probably be best known for a sorry marketing strategy of trying to look just like IBM – if it's not best remembered for the way it cashed in its chips.

RCA's first computer was the vacuum tube monster Bizmac, delivered on special order to the Army in 1955. Vacuum tube monsters were going out of style, though, so RCA technicians set to work on the medium scale 501, the world's first fully transistorized general purpose computer. The 501 was first installed in 1959.

Their next machine was the smaller 301, which had success competing with the 1401. The real-time 3301, and the negligibly successful 601 rounded out RCA's second generation.

The most important product announcement in data processing came in April, 1964 – IBM's System/360. Already bitten by the idea of holding onto IBM's

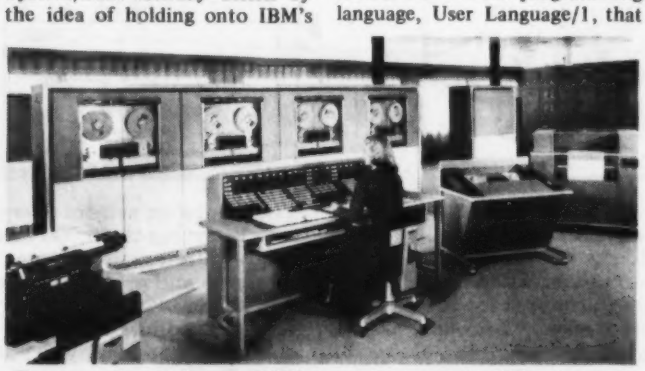


Bizmac, RCA's first computer, was a "vacuum tube monster" delivered to the Army in 1955.

aged about 1,400 Spectra 70/15s, 70/25s, 70/35s, 70/45s, 70/46s, 70/50s, 70/60s, and 70/61s. Now this is nothing to sneeze at; current industry estimates say that RCA's installed base pulls down some $12 million a month in rentals. But in the computer game, $150 million a year in rentals is only a few cuts above charitable contributions.

And there were a few other little excursions on the road to Marlboro:

- In April, 1968, RCA started a service bureau joint venture with Commercial Credit Corp.; in August, 1968, Commercial Credit was bought by Control Data.
- In September, 1969, RCA announced a new programming language, User Language/1, that



The most innovative of RCA's machines was the 501, the first all transistor general purpose computer.

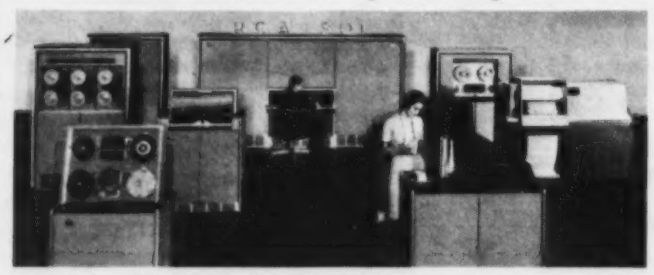
coattails, RCA announced its Spectra 70 series in December, 1964. The Spectras were data and software compatible with the 360s, and RCA planned to carve a chunk of the market by sheer price competition.

RCA couldn't have picked a better model; the 360s were phenomenally successful. RCA was nowhere near as successful selling its copies. One of the main reasons for IBM's success was the speed, quality, and extent of its support services – hand holding for users new to

was to combine the advantages of APL and PL/1; in the words of one industry observer, "market demand was underwhelming," and UL/1 quickly sank from sight.

- In the early 60s, RCA helped develop the Autodin communications network for the Department of Defense, creating the basis of its current data communications hopes; the RCA computers that originally drove the system were eventually replaced with IBM machines.

By 1970 things looked medi-



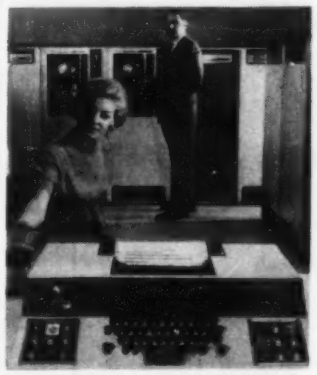
The 301, RCA's second commercial computer, competed with IBM's 1401 in the small scale market.

data processing. While RCA could second source the hardware, solicitousness toward customers wasn't on any blueprint.

1,400 Installations

So, while IBM placed 360s at some 40,000 sites, RCA 'manocre at RCA's computer operations. IBM's announcement of the System/370 had taken the wind out of the Spectras' sales, and it was becoming more difficult to find users who wanted an IBM second source. Sales quotas were lagging.

So, along with building shiny new facilities for the data processing division that was to carry RCA into the profitable 70s, Chairman Sarnoff hired away from IBM a bright executive to take charge of the operation.



IBM introduced the System/360 in April, 1964, and RCA brought out the Spectra line in December, 1964.

Sarnoff, who had said, "if you can't lick 'em . . ." before and had hired a management consultant who had just done a deep study of IBM, this time hired an actual IBMer, L.E. Donegan, known familiarly around Marlboro as Mister Ed.

Donegan in turn brought a whole crew of IBMers with him, all determined to apply rational, IBM-style management, to RCA.

To confront the 370s on the

The Spectras were data and software compatible with the 360s; some, like this 70/46 also had virtual memory.

hardware front, RCA refurbished four Spectra models and rechristened them the RCA 2, 3, 6, and 7. The 3 and the 7, like the Spectra 70/46 and 61 offered virtual memory, RCA's main hardware advantage over IBM.

RCA management apparently felt that most users were memory bound, and since additional core is an expensive item, users would jump to virtual memory to solve their problems, even though they hadn't exactly come flocking for the Spectras with virtual memory.

Nonetheless, the technique was

the only one that showed any possibility of leading RCA out of the wilderness and into profitability – an oasis the division had visited only twice in its history.

There is some indication that the new series was a holding action, and that RCA planned to unveil another new line late this year.

In 1970 and again in 1971, Chairman Sarnoff and other RCA officials proclaimed their intention of becoming the country's second largest computer vendor, and, incidentally, of committing whatever resources were necessary to reach this goal.

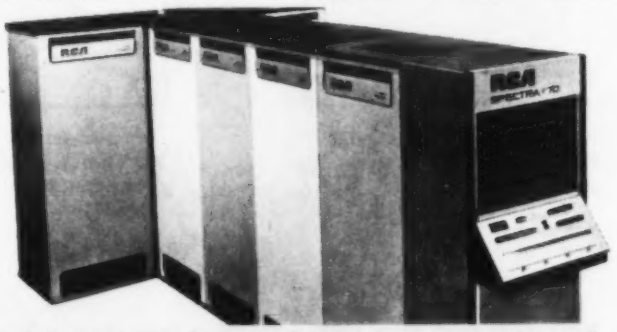
In order to accomplish this task, RCA management decided to attack IBM directly. The 360/30, 40, and 50 user base was IBM's most loyal and most profitable. After loading its rifle with guaranteed conversion, RCA took aim at this base.

IBM's 360/30, 40, and 50 user base escaped unscathed.

Only a handful of guaranteed conversion contracts were signed, and there were orders for less then 150 R series computers – a tenth of management's projections.

Reasons for Failure

There were many reasons for the failure. The Spectra series had already picked off the bulk



But all together, only about 1,400 Spectras were sold, hardly the success RCA had hoped for.

of users who wanted IBM-type equipment but didn't want IBM.

The general business users RCA was after had been carefully nurtured and attended to by IBM since tab card days, and they weren't interested in fancy equipment or contracts, only in getting the work out regularly and on time. Spectra owners who upgraded to R series ended

The last line was the R series, the RCA 2, 3, 6, and 7. The refurbished Spectras were a market flop.

up side-grading, and didn't create any new revenues for the company.

And IBM fought to keep its base – and IBM, after all, is IBM. With gloves on, it's a formidable competitor; with gloves

off . . . .

So, one Friday late in September, Chairman Sarnoff presented to the board of directors an assessment of where RCA stood in the computer game, and how much money – $500 million – it

The most popular of the Spectra series, the 70/45, was installed at over 500 sites.

would have to ante to play the next hand. The board accepted Sarnoff's suggestion to cash in.

Their Masters' Voices

But deciding to get out and getting out are two different breeds of cat. The operational questions of sale, dismemberment, user support, employee relocation, legal liability, and a multitude of other questions were not answered by the board. board.

So management in Marlboro and Cherry Hill, hearing the tune from above, broke into a spastic little dance number called the Selloff Shuffle. Everyone makes up his own steps, and tries to change partners as quickly as possible.

RCA's stock went up, and IBM salesmen smiled, but not because they owned RCA stock. And RCA computer history is finished.

RCA Employees Just Get Platitudes and Generalities

(Continued from Page 41)

many cannot turn it off.

Top management is even less in evidence than before; the big limousines mark their passage. The office tower construction and landscaping goes on. Meetings continue to be held, studies go on, work gets done, almost as a reflex of a dying animal. Rumors of a massive layoff are rife. But absolutely no information comes through.

Nothing but rumor, and "policy" passed by secretaries, which seems to change from hour to hour. Transfers will be returned from whence they came, new hires won't. Then, new hires will. Partial years of employment won't count toward severance, then they will. The only certainty is a massive layoff Friday.

As the week goes on, and work slowly winds down, the cafeteria becomes the focal point. It is filled from morning to night with small groups, discussing rumors. Funny, you don't talk about the situation in your work area, you go to the cafeteria to do that. Oddly enough, to an outsider it looks like business as usual.

As "layoff Friday" approaches, rumors increase, and the strategy becomes apparent, although not stated. You are a material resource of the company, and they are going to try to preserve certain of the most saleable organizations while cutting expenses to the level of revenue. Now you know how professional atheletes feel, only without the glamour.

You can tell the top managers who have management contracts. They refuse to play games with the layoff list. Others let those who already have job offers volunteer for layoff, so those who don't will have more time. Most shook are those in purely staff activities, and people with 15 to 20 years service. Until the shutdown announcement, people with more than 15 years were protected from layoff, but the policy got changed to 20, somehow.

Gallows humor abounds. "After this is over, all the top execs are going back to IBM for their next assignment . . ." The NTS-500 processor is renamed the "Run-off 4.98."

Friday, a "pep talk" is held, full of platitudes and innocuous generalities, but no data. You can tell whose being laid off because they are not in attendance – they're getting the word while you get your pep talk.

Those laid off get nothing in writing, but are told to come in next week for exit interviews. People who weren't laid off avoid those who were, like Jonahs. You find yourself doing it. Thirty percent got chopped, mostly on the basis of what organization they were in. Some of those had transferred from one organization to another only a few days earlier, and it is obvious the cut is purely arbitrary.

The second week is again "business as usual," except the traffic in the cafeteria has cut back somewhat. Still no data, although Monday brings a memo from a vice-president about attendance. Only those who already have been laid off are eligible for transfer to other locations in the company.

People who were laid off come back for interviews, must be escorted everywhere. They still get nothing in writing. Various teams of potential buyers tour the facilities. People from Siemens, the European licensee, are tossed out of one area for attempting to interview for hiring.

Memo from Ed Donegan: ". . . Discussions have commenced with other companies. Obviously we do not know what the outcome of these discussions will be, but I thought it important to keep you informed." Someone starts a collection to buy him a newspaper, so he can be as well informed as we are.

The second week ends with the word passed from the top, verbally, sort of an "official rumor." There are two potential buyers who have one week to get into "serious negotiation" or everything goes down the tube. So those of us who are left sit here, marking time, waiting for the other shoe to drop.

New Trade Bill Hits Multinational Firms

WASHINGTON, D.C. – The Foreign Trade and Investment Act of 1972, introduced in the Senate by Sen. Vance Hartke (D-Ind.) and in the House by Rep. James A. Burke (D-Mass.), if enacted would discourage American business investment abroad and limit the flow of imports into this country.

It would also effectively halt any holder of a U.S. patent from producing the patented product abroad or from licensing someone else to produce it abroad, if the President felt it would not be in the best interests of this country.

Hartke, said that the bill "would be a giant step toward restoring America's economic health and regaining balance in its international trade and investment.

"The bill provides for removing from U.S. tax laws, the special advantages for American businessmen who control factories overseas . . . These advantages are outdated and only their removal will help stop the export of American jobs, know-how and dollars," Hartke said.

Patents Hit

The effect of the bill in the patent area would be to present a U.S. patentee with some very difficult choices if he wanted to produce his product abroad.

If he held U.S. and Japanese patents on the same product and he wanted to license someone to produce it in Japan, he could be ordered not to issue the license, primarily because it would not be in the best interests of the U.S.

The effect is to protect U.S. jobs and technology where it is felt to be in the best interests of the nation as opposed to a multinational corporation, for example.

U.K. Government Promises ICL Aid

CW European Bureau

LONDON – ICL has received commitments from the British government to finance development contracts. It has also received assurances that preferential purchasing policies and other forms of support, including the state shareholding in ICL, will be maintained.

Further measures of support will be considered, according to Fred Corfield, Minister for Aerospace, in the light of any additional support given to other computer industries by their governments.

The Advanced Computer Technology Project is to be maintained, again primarily for the benefit of ICL, and the government has also guaranteed the continued availability of adequate funds for Computer Leasings Ltd. (ICL's leasing company for the home market).

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U.S. Firms Finding Profits Overseas, Commerce Department Offers Aid

WASHINGTON, D.C. – An increasing number of EDP firms are finding new sources of profit in foreign sales. In moving into export trade markets, U.S. companies are receiving not only encouragement but specific assistance from the U.S. Department of Commerce's Bureau of International Commerce (BIC).

In addition to identifying potentially profitable export opportunities, the field office representatives also explain how American EDP companies can launch their overseas sales through the Office of International Trade Promofion at BIC. All that a U.S. company needs to participate in an international trade fair or a trade center exhibit is a product for display; a qualified representative assigned to man its booth; and a contribution to the exhibit of usually less than $1,000.

Does participation in BIC's program pay off? It has for Script Associates, Seattle, Wash., a software company whose principal product is a "multi-lingual" computer software language.

Referring to BIC's Global Market Survey, President Hugo Mach comments: "I doubt that there would be over a dozen software firms in the U.S. who could afford to undertake a survey on this scale. It has provided us with the solution to our principal problem of market identification and penetration. We expect it to result in solid market penetration five to ten times faster than we'd thought possible."

Another company that has used BIC help is Microseal, Evanston, Ill. Although the company began exporting in 1963, it had no marked success until 1970. That spring BIC began to make available World Markets for U.S. Exports reports, which were used by Microseal's President, Thomas B. Anderson and its Sales Manager, Thomas E. Graves.

Microseal also gained marketing exposure for its products overseas by exhibiting them at U.S. Trade Center Shows. Microseal exhibited in March 1970 in Prague, Czechoslovakia and in June 1970 at the Stockholm Trade Center Advanced Reprographic Equipment Show.

"Trade Center shows like these have been of major importance for increasing our foreign sales," says Anderson.

Recently-established firms whose current overseas sales are relatively small, but whose business contains growth potential, can also profit from using the services of the BIC. Interdata Inc. of Oceanport, N.J. is a case in point.

Founded in 1966, Interdata entered the export field for the first time in 1968 with sales of $105,000. Encouraged by the New York Field Office, Interdata agreed to an in-office export seminar.

In 1969, Interdata's foreign sales of $192,000 represented 3.4% of the company's total sales in 1970. For the first half of 1971, the figure rose again to 33% of total sales.

Foreign markets for EDP are growing at twice the rate of U.S. markets, according to Commerce's "Global Market Survey," and sales and leases of EDP equipment to countries of the free world are expected to reach $6 billion in 1973.

Process Control Unit Designed For Severe Environments By DEC

MAYNARD, Mass. – Digital Equipment Corp. has introduced a real-time process control and data acquisition system.

The IDACS 11/07 system, designed to operate as a stand-alone unit or as a satellite in a hierarchical system, is capable of monitoring up to 256 analog or 512 digital inputs.

The IDACS 11/07 features a package that allows it to communicate with other computers including the DECsystem-10, other members of the PDP-11 family, and the IBM 1130, 1800, 360 and 370 computers.

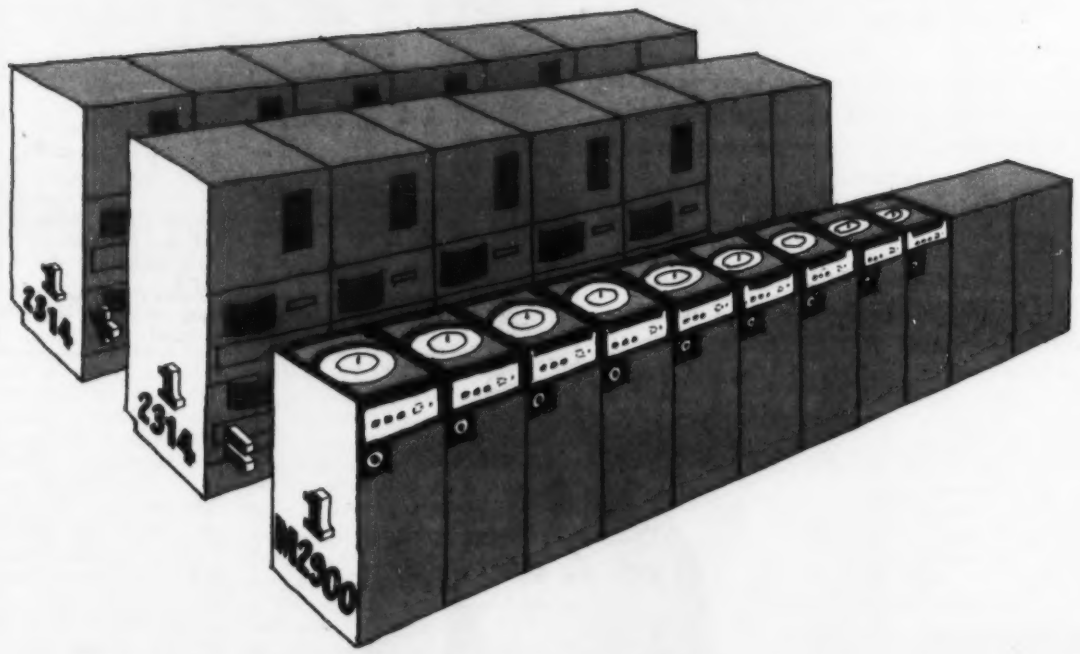
Two specialized multiplexing devices are included: The Analog Flying Capacitor permits the user to wire all analog inputs with two wire twisted pair cable and the Universal Digital Controller is a universal input/output system. The units will be delivered in early 1972. Prices start at $15,000.

OCR to Replace Keypunches At Some Navy Installations

WASHINGTON, D.C. – The Navy's Automatic Data Processing Equipment Selection Office plans to replace IBM keypunch equipment at a number of inventory control points.

According to Capt. W. Fred Weihrich, director of Adpeso, the Navy will attempt to validate whether or not the OCR machines can help each activity save more than $5,000 a month in personnel and equipment costs.

Marshall M2900 Saves 45%



	(1) MARSHALL M2900 =	(2) IBM 2314'S
Cost:	$5,545 per month	$10,128 per month
Storage Capacity:	466.8 Million Bytes	466.8 Million Bytes
Space Requirements:	150 Square Feet	360 Square Feet
Disk Packs Used:	2316 (or equivalent)	2316 (or equivalent)
Start/Stop Time:	24 Seconds	82 Seconds

The point here is a simple one. It now takes **TWO** IBM 2314's to deliver the storage capacity of **ONE** MARSHALL M2900 Dual Density Direct-Access System. **One** complete M2900 System (9 spindle) costs $5,545 per month as compared to **two** IBM 2314's costing $10,128 (or $5,064 each) per month on a 1 year lease. Point by point you get *more* with MARSHALL DATA SYSTEMS' M2900. You get twice the storage capacity – in less than half the floor space – at nearly ½ the cost per byte, plus – full compatibility. The M2900 Disc System has OS/DOS compatibility with IBM System/360 (model 25 and above) and IBM 370 all models. If you'd like to form *your own* comparison – then for a cost analysis breakdown and brochure – give us a call.

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Securities Industry Plans New Moves That Will Increase Trading Automation

By a CW Staff Writer

NEW YORK – In recent weeks the securities industry has made three major moves that could lead to greater automation in all phases of its business.

The New York Stock Exchange has approved a plan to test the computer execution of 100-share market orders and the American Exchange followed suit.

The third move came when the Banking and Securities Industry Committee (Basic) approved a plan calling for a central depository of stock certificates to reduce the physical movement of such certificates.

In the first program, the NYSE board of governors had authorized spending $300,000 for the pilot portion of a project that could eventually lead to expenditure of an additional $7.4 million to develop the system for computer execution of 100 share orders.

If the Exchange decides to go ahead with the project, called the Automated Trading System (ATS), after the initial test, it would be fully implemented by late 1973, exchange spokesmen said.

Using the system, a specialist would provide ATS with quotes and size for each of his stocks based upon the best bids and offers in the crowd, on his book, or in his own position.

Brokerage houses would transmit their 100-share market orders directly to the NYSE computer or to a clerk on the exchange floor who would relay them to the computer system.

As each incoming order is received, the ATS computer would automatically execute it against the specialist's quote, provided no stop is requested.

After the execution, the computer would update the size connected with the quotes, report the trade on the ticker, notify the firm involved that its order to buy or sell has been executed and tell the specialist of his part in the trade.

The American Exchange has approved a similar program, but no expenditure figures have been released as yet. The program would call for the automation not only of all 100 share market orders but also all odd-lot orders. It would be complete by the middle of 1974, spokesmen said.

Basic said that its move in this area is "potentially the most important step yet taken to reduce the physical movement of stock certificates." The group is made up of the NYSE, Amex, National Association of Securities Dealers, and the New York Clearinghouse Association, which is sponsored by 11 major commercial banks here.

The plan would call for the establishment of a Comprehensive Securities Depository System that "may hold well over 5 billion shares of stock and handle up to 100,000 transactions a day by computerized book entries," according to spokesmen.

The arrangement calls for the sponsoring groups to expand and eventually operate the Central Certificate Service, which is the NYSE's stock depository, and which would be set up as a separate entity.

The agreement also looks to the development of a national depository system for stock certificates, possibly with regional depositories interconnecting with the central system here.

In anticipation of this move, the Central Certificate Service is about to broaden its operations to include the Midwest and Pacific Coast Stock Exchange Clearing Corporations, spokesmen stated.

In addition, other types of financial institutions, such as mutual funds and insurance companies would be encouraged to participate in the expanded stock depository, according to John M. Meyer Jr., chairman of Basic.

Studies conducted by Basic indicate the movement of stock certificates among New York banks and brokers could be reduced more than 50% through the contemplated system and "a system of regional depositories with bank and brokers throughout the country participating, may be able to reduce their stock certificate movements 75%," Meyer said.

Magnetic Heads Gets Cash

ARCADIA, Calif. – George A. Wenzel, chairman of the board and chief executive officer of Magnetic Head Corp. has announced a $1.2 million investment in MHC by Santa Anita Consolidated, Inc., here.

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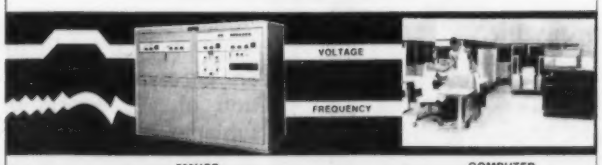

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Choosing a Minicomputer for a System — Stripped minis or complete systems?

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Control Data introduces double density disk system for IBM/360, 370 users

Twice as much, twice as fast

Control Data Corporation now is delivering a high-density, multiple-disk storage system plug-to-plug interchangeable with the IBM 2314. This makes it possible to update System/360 or 370 computers for *twice the storage, at twice the access speed,* without investing in a more powerful mainframe.

Cost savings immediately available

Already in service. the CDC 23142 makes Control Data the first computer systems manufacturer to offer the cost advantages of a double-density memory system in a compact package — *with worldwide logistics support.* The CDC 23142 packs data onto disks at 200 tpi — resulting in megabyte costs significantly lower than the IBM 3330...for up to 466 million bytes of on-line storage. It offers up to 466,816,000 bytes storage, with access speeds averaging from 25 to 35 milliseconds. An advanced linear resolver, a servo system for carriage positioning and glass-base heads result in high-speed tracking accuracy equal to that of much larger systems.

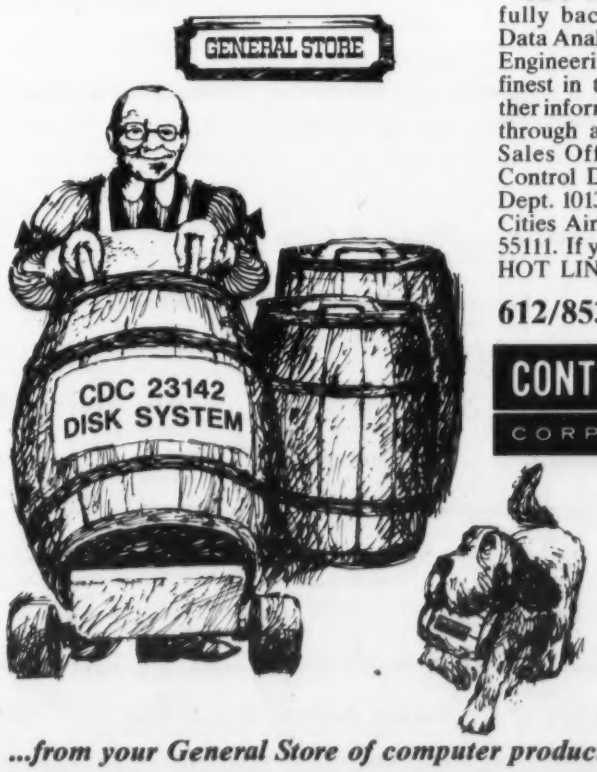
No software modifications needed

The CDC 23142 drive is interchangeable at the 360 or 370 selector channel, uses the same command set as the IBM 2314. No software modifications to OS or DOS required. With few exceptions, it uses same disk packs as the IBM 2314 that have been reinitialized for 200 tpi recording.

CDC 23142 systems incorporate 16 unique logic plugs — 240 plug combinations — giving you far greater flexibility than would be possible using other mass storage devices.

CDC 23142 systems are fully backed by Control Data Analyst and Customer Engineering support — the finest in the industry. Further information is available through any Control Data Sales Office. Or contact Control Data Corporation, Dept. 1013, Box 1980, Twin Cities Airport Station, MN 55111. If you prefer call our HOT LINE collect:

612/853-3535



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New Registrations

COMPUTER EQUIPMENT CORP., 9900 Baldwin Place, El Monte, Calif., a company engaged in the computer peripheral equipment, electronics and construction industries, filed to register 37,196 shares of common stock. These shares are to be offered in exchange for shares of common stock of Data Measurements Corp. at the rate of one share for each ten Data Measurement shares.

TELEX CORP., 6422 E. 41st St., Tulsa, Okla., a company engaged in manufacturing and marketing of computer peripheral devices and audio communication equipment, filed to register $25 million of subordinated debentures, due 1996, with warrants to purchase shares of common stock, to be offered for public sale in units consisting of $1,000 debenture and an unspecified number of shares. Proceeds intended to retire short-term bank loans and the balance for working capital and other corporate purposes. The underwriters are headed by New York Securities Co., One New York Plaza, New York, N.Y. 10004.

DCL INC., Park/80 Plaza East, Saddle Brook, N.J., a company primarily engaged in leasing computers and related equipment, filed to register 1 million shares of common stock, of which 254,800 are outstanding shares and 745,200 are issuable upon conversion of $4,968,000 of outstanding 6% convertible subordinated notes, due 1977. These shares to be offered for public sale at $8.75 per share maximum. The underwriters are headed by Bear, Stearns & Co., One Wall St., New York, N.Y. 10005.

Nickels & Dimes

In an effort to keep our computer stock trading summary of the greatest possible interest to the data processing community, CW has reorganized the contents of the summary. Some stocks have been dropped to make room for other issues. In no case is this a reflection on the value of the stock, merely on its interest to our readers.

$$$

South Shore Publishing Co. may be the first publicly held corporation in the country to do away with stock certificates in a test project designed to replace certificates with computer printout. The test, to be conducted by the Boston Stock Exchange and the First National Bank of Boston, calls for the company to recall the 325,000 outstanding shares. The firm's transfer agent, First National, would keep a record of all holdings on magnetic tape and send each stockholder a computer statement of his holdings once a year or when changes are made.

$$$

DPA Inc. "anticipates a record year in sales, earnings and earnings per share and expects the strong earnings trend to continue into 1972," according to John B. Tuthill, president. Part of the optimism is because "data processing equipment leasing...continues at high levels," he said.

$$$

Eldorado Electrodata Corp. has signed an agreement with **W.W. Leasing Unlimited** giving Eldorado a $10 million line of credit and calling for W.W. Leasing to purchase computer lease and rental contracts sold by Eldorado. The major effect is to provide Eldorado with immediate income and profit from leases, spokesmen said.

$$$

Scientific Software Corp. has received a "substantial pool of working capital" through the sale of 36 acres of land to Trans-Pacific Industries, Inc. for $1.2 million. The transaction also gets Scientific out of the real estate business so it can concentrate on its main business – computer-based management systems, the firm said.

$$$

Computest Corp. will report a loss for the first quarter with the slow start partly due to a decline in backlog of orders. In addition, the firm said it would be hurt by the RCA decision to drop out of the computer business.

$$$

Milestone – First quarter earnings were in the black for the first time in the history of **Information and Computing Centers Corp.**, President Walter L. Ent said. The firm made $9,370 (1 cent per share) on sales of $189,000. In the corresponding period a year ago, the firm lost $231,000 (36 cents per share).

This announcement is under no circumstances to be construed as an offer to sell or as a solicitation of an offer to buy any of these securities. The offering is made only by the Prospectus.

September 24, 1971

CMC

1,376,000 Shares

Computer Machinery Corporation

Common Stock
(Par Value $0.10 per Share)

Price $12 Per Share

Copies of the Prospectus may be obtained in any State in which this announcement is circulated from only such of the undersigned or other dealers or brokers as may lawfully offer these securities in such State.

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EuroPartners Securities Corporation — Robert Fleming Incorporated — Hill Samuel Securities Corporation

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Shields & Company Incorporated — F. S. Smithers & Co., Inc. — Thomson & McKinnon Auchincloss Inc.

Spencer Trask & Co. Incorporated — Tucker, Anthony & R. L. Day — Wood, Struthers & Winthrop Inc.

DATA ENTRY

In the October issue of EDP ANALYZER, you get an 8000-word analysis of the new key-to-disk systems:

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- Factors for figuring costs

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Computerworld Stock Trading Summary

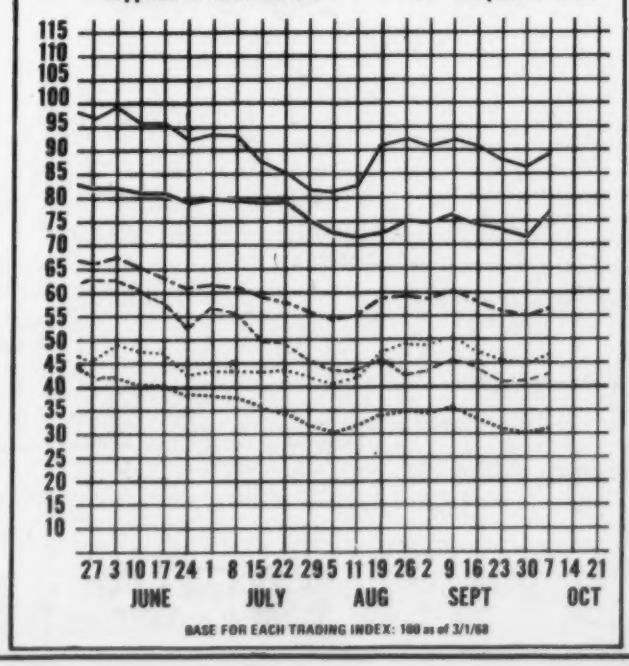
All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

CLOSING PRICES THURSDAY, OCTOBER 7, 1971

EXCH		1971 RANGE (1)	CLOSE OCT 7 1971	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 4	1 7/8	+ 3/4	+66.6
A	APPLIED DATA RES.	5- 13	6 1/2	0	0.0
O	APPLIED LOGIC	1- 3	5/8	0	0.0
N	AUTOMATIC DATA PROC	44- 65	63 1/2	+1 1/2	+2.4
O	AUTO SCIENCES	2- 8	1 5/8	- 7/8	-35.0
O	COMPUTER NETWORK	2- 11	8	+ 1/2	+6.6
O	COMPUTER PROPERTY	5- 11	5 1/4	+ 1/4	+5.0
N	COMPUTER SCIENCES	8- 17	8	+ 1/8	+1.5
O	COMPUTER TECHNOLOGY	5- 11	7 1/8	+ 3/8	+5.5
O	COMPUTER USAGE	5- 16	7 1/8	- 1/8	-1.7
O	COMP AUTOMOT REPORTS	6- 13	8 1/4	- 1/4	-2.9
N	COMPUTING & SOFTWARE	23- 45	24	0	0.0
O	COMRESS	2- 4	1 5/8	- 1/8	-7.1
O	COMSHARE	4- 8	4 1/2	+ 1/8	+2.8
O	DATA AUTOMATION	1- 4	1	- 1/8	-11.1
O	DATA PACKAGING	6- 10	7 5/8	0	0.0
O	DATAMATION SERVICE	1- 3	7/8	0	0.0
L	DATATAB	4- 10	6 5/8	- 3/8	-5.3
O	EDP RESOURCES	7- 16	9 1/4	+1 1/4	+15.6
A	ELECT COMP PROG	3- 7	2 5/8	- 1/8	-4.5
N	ELECTRONIC DATA SYS.	50- 85	50 7/8	+1 1/4	+2.5
O	INFORMATICS	7- 15	8 7/8	0	0.0
O	I.O.A. DATA CORP	1- 3	1 1/4	0	0.0
A	ITEL	10- 23	10 1/8	- 1/2	-4.7
O	KEANE ASSOCIATES	4- 14	7	+2 1/2	+55.5
O	KEYDATA CORP	7- 14	7 1/8	- 1/8	-1.7
A	MANAGEMENT DATA	7- 11	7 5/8	- 1/8	-1.6
O	NATIONAL CSS INC	7- 14	8 1/4	- 1/2	-5.7
O	NAT COMP ANALYSTS	1- 4	1	- 1/8	-11.1
O	ON LINE SYSTEMS INC	7- 18	9 1/2	0	0.0
N	PLANNING RESEARCH	16- 26	16 3/8	+ 1/4	+1.5
O	PROGRAMMING METHODS	18- 29	18 1/2	0	0.0
O	PROGRAMMING & SYS	2- 4	1 3/4	0	0.0
O	SCIENTIFIC COMPUTERS	2- 3	2 3/4	0	0.0
O	SIMPLICITY COMPUTER	1- 4	3 3/4	0	0.0
O	SOFTWARE SYSTEMS	1- 3	1 1/4	- 1/2	-28.5
O	TBS COMPUTER CENTERS	4- 9	6 1/4	+ 1/2	+8.6
O	TOLLEY INTL CORP	3- 8	6 1/8	- 3/8	-5.7
O	TPACOR COMPUTING	2- 5	2 5/8	0	0.0
O	TYMSHARE INC	4- 15	9 3/4	+1 5/8	+20.0
O	UNITED DATA CENTER	2- 7	5 1/8	+ 1/8	+2.5
N	UNIVERSITY COMPUTING	21- 38	24 1/4	+ 3/4	+3.1
A	URS SYSTEMS	6- 11	5 7/8	- 1/8	-2.0
O	VORTEX CORP	2- 6	5 1/4	- 1/2	-8.6
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	24- 48	38 1/4	+1 3/4	+4.7
O	ALPHANUMERIC	2- 6	1 7/8	0	0.0
N	AMPEX CORP	14- 25	15 3/8	+1 5/8	+11.8
O	ANDERSON JACOBSON	6- 10	6 7/8	- 3/8	-5.1
O	ATLANTIC TECHNOLOGY	3- 8	5 1/4	+ 3/4	+16.6
A	BOLT,BERANEK & NEW	5- 8	5	+ 1/8	+2.5
N	BUNKER-RAMO	7- 17	7 3/8	- 1/8	-1.6
A	CALCOMP	16- 33	17 1/8	- 1/8	-0.7
O	COGNITRONICS	3- 9	2 1/2	- 1/2	-16.6
O	COLORADO INSTRUMENTS	2- 8	2 1/2	+ 1/4	+11.1
O	COMPUTER COMMUN.	6- 19	8 3/4	+2 1/4	+34.6
A	COMPUTER EQUIPMENT	4- 7	3 3/4	+ 1/8	+3.4
A	COMPUTEST	6- 20	6 3/4	+ 1/2	+8.0
O	CONSOL COMPUTER LTD.	2- 12	2	-1	-33.3
A	DATA PRODUCTS CORP	4- 10	4 3/4	- 1/4	-5.0
O	DATA RECOGNITION	3- 8	5 1/2	+ 1/4	+4.7
O	DATA TECHNOLOGY	3- 9	4 3/8	0	0.0
O	DIGITRONICS	3- 8	2 1/2	- 3/4	-23.0
N	ELECTRONIC M A M	8- 16	8 3/8	- 3/8	-4.2
O	FABRI-TEK	2- 4	2 3/4	0	0.0
O	GENERAL COMPUTER SYS	6- 10	8 1/2	- 1/4	-2.8
N	GENERAL ELECTRIC	53-124	64	+2 1/2	+4.0
O	INFOREX INC	23- 49	26 1/4	+4 1/4	+19.3
O	INFORMATION DISPLAYS	5- 8	4 3/4	0	0.0
O	MANAGEMENT ASSIST	1- 2	3/4	0	0.0
A	MARSHALL INDUSTRIES	12- 27	12 7/8	+1 1/8	+9.5
N	MEMOREX	27- 78	35 1/4	+1 3/8	+4.0
A	MILGO ELECTRONICS	12- 26	15 1/4	+2 5/8	+20.7
N	MOHAWK DATA SCI	22- 47	25 1/4	+2	+8.6
O	OPTICAL SCANNING	7- 18	7 3/4	- 7/8	-10.1
O	PHOTON	7- 12	8 1/4	- 1/8	-1.4
A	POTTER INSTRUMENT	13- 25	16	+ 1/2	+3.2
O	PRECISION INST.	7- 15	11	- 1/2	-4.3
O	RECOGNITION EQUIP	12- 26	14 1/8	-1	-6.6
O	REDCOR CORP.	2- 9	2 3/8	- 3/8	-13.6
N	SANDERS ASSOCIATES	10- 22	12	+1 1/4	+11.6
O	SCAN DATA	6- 15	11 5/8	+ 3/8	+3.3
O	TALLY CORP.	8- 16	9 3/8	- 1/2	-5.0
N	TELEX	13- 22	12 7/8	- 3/4	-5.5
	SUPPLIES & ACCESSORIES				
N	ADAMS-MILLIS CORP	12- 19	13 1/4	+1	+8.1
O	BALTIMORE BUS FORMS	6- 10	8 1/4	+ 1/4	+3.1
A	BARRY WRIGHT	7- 13	7 7/8	+1 1/8	+16.6
A	DATA DOCUMENTS	15- 29	17	+1 1/2	+9.6
O	DUPLEX PRODUCTS INC	8- 11	11 1/2	+1	+9.8
N	ENNIS BUS. FORMS	6- 13	6 5/8	- 3/8	-5.3
O	GRAHAM MAGNETICS	9- 35	21 1/4	+2 1/2	+13.3
O	GRAPHIC CONTROLS	6- 15	13 3/8	+1	+8.0
N	3M COMPANY	96-126	123 7/8	+1*1/2	+1.2
O	MOORE BUS. FORMS	36- 42	38 3/4	+1	+2.6
N	NASHUA CORP	29- 47	45 1/4	-1	-2.1
O	REYNOLDS & REYNOLD	37- 63	62 1/4	+1 1/4	+2.0
O	STANDARD REGISTER	17- 23	16 3/4	0	0.0
O	TAB PRODUCTS CO	8- 17	15 3/4	+3 1/4	+26.0
N	UARCO	25- 34	26 1/2	+ 1/4	+0.9
A	WABASH MAGNETICS	6- 10	6 1/8	0	0.0
N	WALLACE BUS FORMS	18- 26	22 1/2	+ 1/2	+2.2
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	105-143	142 1/8	+7 5/8	+5.6
N	COLLINS RADIO	12- 20	13 1/2	+ 1/8	+0.9
N	CONTROL DATA CORP	45- 83	44 1/2	-2 1/4	-4.8
O	DATA GENERAL CORP	19- 65	58 3/4	-1	-1.6
O	DIGITAL COMP CONTROL	4- 24	17 1/2	+ 1/2	+2.9
N	DIGITAL EQUIPMENT	53- 85	77 1/2	+2	+2.6
N	ELECTRONIC ASSOC.	5- 9	5 3/4	- 1/4	-4.1
A	ELECTRONIC ENGINEER.	5- 10	10 1/8	+2 1/8	+26.5
N	FOXBORO	25- 46	40 1/2	- 3/8	-0.9
O	GENERAL AUTOMATION	9- 26	15	+1	+7.1
N	HEWLETT-PACKARD CO	30- 46	46 1/8	+1 1/2	+3.3
N	HONEYWELL INC	83-115	108 3/8	+1 3/4	+1.6
N	IBM	284-364	308 1/2	+4 3/4	+1.5
O	INTERDATA INC	6- 11	9 1/4	+ 3/8	+4.2
N	NCR	33- 49	33	-1 3/8	-4.0
N	RCA	26- 41	36 3/4	- 1/8	-0.3
N	RAYTHEON CO	27- 46	37 1/4	+ 1/4	+0.6
N	SPERRY RAND	25- 38	27 3/4	+1 5/8	+6.2
A	SYSTEMS ENG. LABS	8- 18	10	+ 1/4	+2.5
N	VARIAN ASSOCIATES	13- 18	14 3/8	+ 1/8	+0.8
N	VICTOR COMPTOMETER	14- 27	16 1/4	+1 1/8	+7.4
NI	WANG LABS.	29- 50	42	-3 7/8	-8.4
N	XEROX CORP	85-121	115 3/8	+ 1/8	+0.1
	LEASING COMPANIES				
A	BOOTHE COMPUTER	13- 27	16 5/8	+ 5/8	+3.9
O	BRESNAHAN COMP.	2- 4	2 1/2	+ 3/8	+17.6
O	COMPUTER EXCHANGE	3- 9	3 1/8	+ 1/4	+8.6
A	COMPUTER INVSTRS GRP	8- 14	9 7/8	- 3/4	-7.0
N	DATA PROC. F & G	11- 19	11 7/8	- 1/4	-2.0
O	DATRONIC RENTAL	2- 4	2 3/4	0	0.0
A	DCL INC	5- 13	8	+ 1/8	+1.5
A	DEARBORN-STORM	24- 44	43 3/4	+3 1/2	+8.6
A	DPA, INC.	4- 9	8	- 1/4	-3.0
A	GRANITE MGT	7- 13	10	+ 5/8	+6.6
A	GREYHOUND COMPUTER	7- 11	8 5/8	+ 5/8	+7.8
N	LEASCO CORP	16- 26	25	+1	+4.1
O	LECTRO MGT INC	2- 5	3 3/8	+ 3/8	+12.5
O	NCC INDUSTRIES	3- 8	6 7/8	0	0.0
A	ROCKWOOD COMPUTER	4- 9	4 1/2	+ 1/2	+12.5
O	SYSTEMS CAPITAL	3- 7	4 5/8	+ 1/8	+2.7
N	U.S. LEASING	16- 39	36	+ 1/2	+1.4

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68

Earnings Reports

LOGIC
Six Months Ended July 2

	1971	a1970
Shr Ernd (Loss)	$.19	$(.33)
Revenue	1,807,922	238,835
Spec Cred	b115,000	.....
Earnings (Loss)	233,638	(309,600)

a-Year ended June 30. b-Income tax loss carryforward, equal to 9 cents per share.

HEWLETT-PACKARD
Three Months Ended July 31

	1971	1970
Shr Ernd	$.20	$.22
Revenue	90,246,000	88,076,000
Earnings	5,312,000	5,547,000
9 Mo Shr	.60	.68
Revenue	261,718,000	262,144,000
Earnings	15,544,000	17,251,000

MARSHALL INDUSTRIES
Year Ended May 31

	1971	1970
aShr Ernd	.....	$1.10
bRevenue	$16,421,000	18,030,000
cNet Cont Op	258,000	354,000
Disc Op (Loss)	(2,408,000)	629,000
Spec Item	d(2,603,000)	e247,000
Earnings (Loss)	(4,753,000)	f1,230,000

a-Based on income before special items. b-From continuing operations. c-Equal to 29 cents a share in 1971 and 40 cents a share in 1970. d-Provision for the decline in market value of investment in Control Data Corp. common stock. e-Consists of gain from sale of partnership interest and a tax loss carryforward credit. f-Equal to $1.37 a share.

DIGITRONICS
Three Months Ended June 30

	1971	1970
Shr Ernd	.....	a$.04
Revenue	$3,804,543	4,599,705
Tax Cred	.....	121,000
Earnings (Loss)	(549,967)	b241,960

a-Based on income before tax credit. b-Income; equal to 8 cents a share.

ELECTRONIC COMPUTER PROGRAMMING INSTITUTE
Three Months Ended June 30

	1971	1970
Shr Ernd	.....	a$.01
Revenue	$684,754	784,128
Spec Item	d(21,906)	b11,161
Earnings (Loss)	(46,836)	c16,971

a-Based on income before special item. b-Credit, from sale of subsidiary. c-Equal to 2 cents a share. d-Loss on sale of a subsidiary.

DATA-CONTROL SYSTEMS
Nine Months Ended July 2

	1971	a1970
bRevenue	$3,191,000	$3,807,000
dSpec Chg	86,000	297,000
Loss	656,000	1,193,000

a-Restated. d-Write-off of new product startup expenses.

SEISMIC COMPUTING
Three Months Ended June 30

	1971	1970
Shr Ernd	a$.26	$.07
Revenue	6,982,000	3,530,000
Spec Cred	b15,000	.....
Earnings	c321,000	80,000
9 Mo Shr	a.40	.14
Revenue	16,586,000	10,610,000
Spec Cred	b35,000	.....
Earnings	c503,000	157,000

a-Based on income before special credit. b-Consists of gain on repurchase of subordinated debentures and tax loss carryforward credit. c-Equal to 27 cents a share in the quarter and 43 cents a share in the nine months.

DOCUTEL
Six Months Ended June 30

	1971	1970
Revenue	$1,683,000	$626,000
Loss	1,801,000	2,014,000

AUTOMATIC DATA PROCESSING
Year Ended June 30

	1971	1970
Shr Ernd	$.87	$.66
Revenue	49,043,543	39,107,029
Earnings	4,807,083	3,365,341

IBM
1130—1800
ADD ON CORE
+8K $9,900
+16K $18,500
NSTALLED IN 10 MINUTES
NO CHANGES TO CPU
CW Box 3483
60 Austin Street
Newton, Mass. 02160

The canister melted; the flanges buckled. The tape came through.

It's Epoch 4.

This was no white-coat lab test—it was a genuine, hook-and-ladder, water-hoses-everywhere-type fire.

When things cooled down, the Graham Magnetics labs found four reels of Epoch 4, with the canisters melted together, and the flanges all heat distorted. The flanges were removed, and the tapes were played on CDC certifiers at a 45% clipping level, at 800 bpi.

Here's how Epoch 4 came through:

Tape #1: no permanent errors; no temporary errors.
Tape #2: one permanent error; three temporary errors.
Tape #3: no permanent errors; one temporary error.
Tape #4: four permanent errors; three temporary errors.

So maybe you don't plan on having a fire.

Nobody does. But even if your tapes never get hotter than a frozen daiquiri, you'll be safer with Epoch 4. Here's why:

Epoch 4 came through the fire because of its physical toughness. The tape withstood the tremendous pressures generated by rapid expansion and contraction, as well as the direct heat.

This same physical toughness is what makes Epoch 4 last so much longer than conventional tapes in normal usage. Because Epoch 4 is 8000% tougher than competitive tapes, it shrugs off the careless handling that causes most damage to computer tape. And because of this toughness, Epoch 4 withstands the stresses imposed by long-term shelf storage.

In fact, Epoch 4 is so tough, we guarantee it for twenty years.

Think it over. Maybe you'll never have a fire. But handling damage and storage stresses will always be around.

Your data deserves the extra protection of the toughest tape in the business.

Your data deserves Epoch 4.

GRAHAM MAGNETICS

GRAHAM, TEXAS 76046